

WEEKLY CURRENT AFFAIRS MAGAZINE for



U.P.S.C.-C.S.E.

JULY-VOL-II-2023

8 July to 15 July



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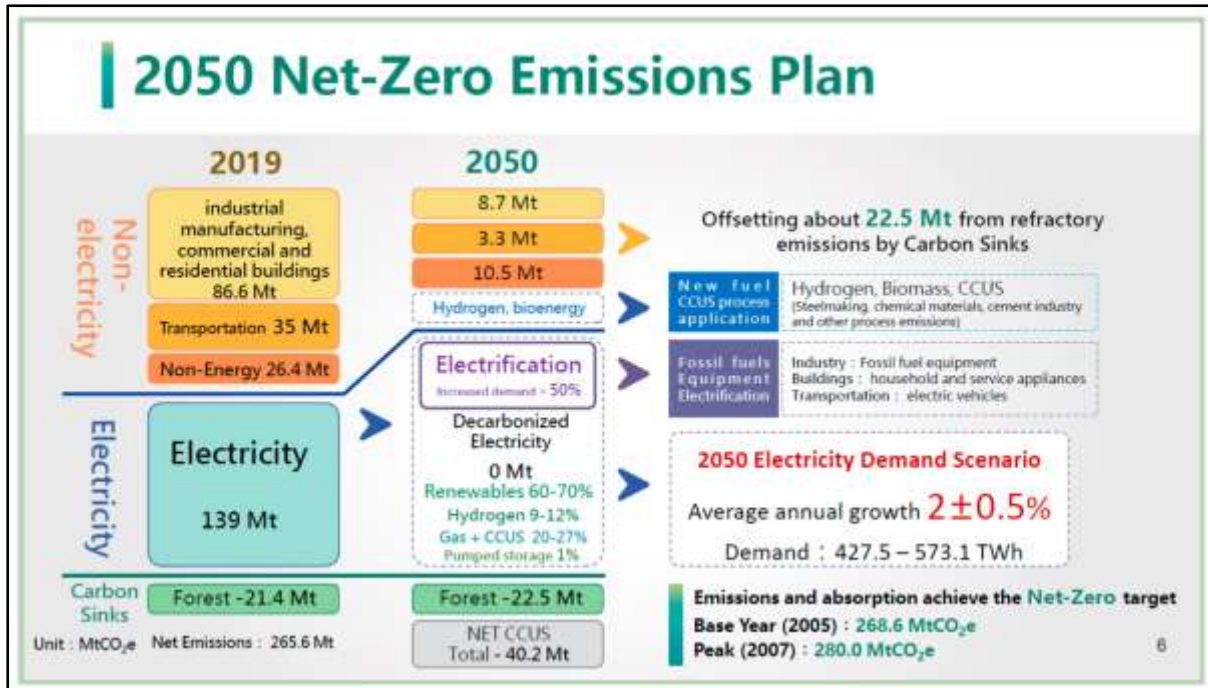
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Topic 1. UNITED NATIONS INTERNATIONAL MARITIME ORGANIZATION AGREES TO REACH NET ZERO “BY OR AROUND” 2050

Important for the subject: Environment



Maritime countries upgraded their Greenhouse House Gas (GHG) emissions strategy to reach net zero “by or around” 2050 without specifying a definite year and taking into account different national circumstances, at the conclusion of the summit of the United Nations International Maritime Organization (IMO) in London on July 7, 2023.

The Marine Environment Protection Committee (MEPC) — 80th session was held at the IMO headquarters (London) from July 3-7.

IMO Greenhouse Gas Strategy 2023:

- The 2023 IMO GHG Strategy adopted calls for the international shipping industry “to reduce the total annual GHG emissions from international shipping by at least 20%, striving for 30%, by 2030, compared to 2008.”
- The draft document agreed upon by member nations says to peak GHG emissions from international shipping “as soon as possible.” This is to limit the global temperature increase to well below 2 degrees Celsius as outlined in the 2015 Paris Agreement.

- It also urged the industry “to reduce the total annual GHG emissions from international shipping by at least 70%, striving for 80%, by 2040, compared to 2008.”
- The near-zero emission technologies, fuels, and energy sources should “represent at least 5%, striving for 10%, of the energy used by international shipping by 2030.”

Biofuels:

- The **IMO** adopted interim guidance which said that **internationally certified biofuel and bio-blends can be used in the shipping industry**. This resolution was backed aggressively by **India** at the conference.
- The **carbon intensity of international shipping** should decline to reduce **CO2 emissions “per transport work”**, on average by **at least 40 per cent by 2030**, compared to **2008** baseline levels.

Just transition:

- The **IMO document**, for the first time, spoke about implementing measures to be and other maritime workforce “that leaves no one behind.”

Carbon emission from maritime shipping sector:

- Maritime shipping is responsible for three per cent of global anthropogenic GHG emissions and these emissions are continuing to grow rapidly. A business-as-usual scenario would see **shipping emissions increase more than five-fold by 2050** if the shipping industry fails to act now.

About International Maritime Organisation (IMO):

- It is the **United Nations specialized agency** and the **global standard-setting authority** for the safety, security and environmental performance of international shipping.
- It was established through the **UN Convention in Geneva in 1948** having its headquarters in **London**. It currently has **174 Member States** constituting its Assembly which **meets biennially**. The Assembly elects **40 Member States** to constitute the Council which acts as a governing body.

Roles:

- Its main role is to **create a regulatory framework for the shipping industry** that is

fair and effective, universally adopted and universally implemented. It **does not have an implementation mechanism.**

- It is also involved in **legal matters**, including liability and compensation issues and the facilitation of international maritime traffic. IMO has **adopted measures to reduce air pollution from ships as well as energy efficiency measures** including the Energy Efficiency Design Index, which is mandatory for new ships, and the requirement for a Ship Energy Efficiency Management Plan, for all ships.

Key IMO Conventions:

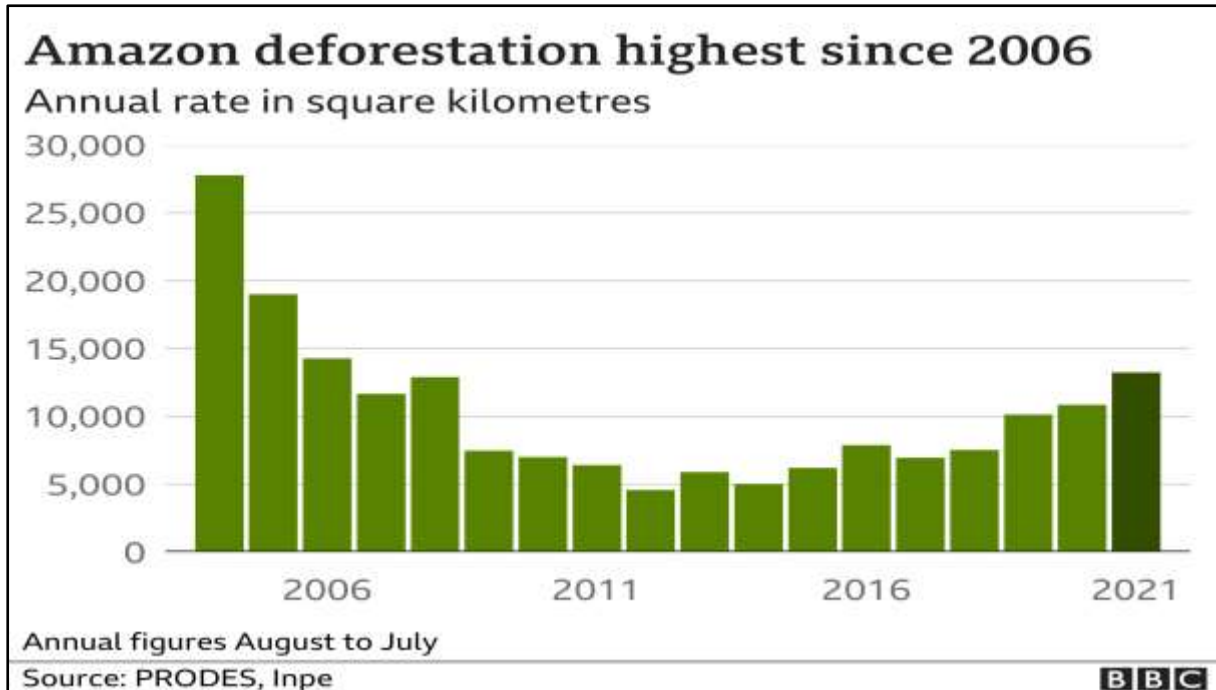
- **SOLAS (1974)** - International Convention for the Safety of Life at Sea.
- **MARPOL (1973)** - International Convention for the Prevention of Pollution from Ships.
- **STCW-** International Convention on Standards of Training, Certification and Watch keeping for Seafarers.

Marine Environment Protection Committee (MEPC):

- The **Marine Environment Protection Committee (MEPC)** addresses **environmental issues under IMO's remit.**
- This includes the control and prevention of **ship-source pollution** covered by the **MARPOL treaty**, including **oil, chemicals** carried in bulk, sewage, garbage and emissions from ships, including **air pollutants and greenhouse gas emissions.**
- Other matters covered include ballast water management, anti-fouling systems, ship recycling, pollution preparedness and response, and identification of special areas and particularly sensitive sea areas.

Topic 2. HOW AMAZON DEFORESTATION RATES HAVE FALLEN SINCE BOLSONARO

Important for the subject: Environment



After four years of rising destruction in **Brazil's Amazon**, deforestation **dropped by 33.6 per cent** during the first six months of President **Luiz Inácio Lula da Silva's** term, according to government satellite data.

- From **January to June** the **rainforest** had alerts for possible deforestation covering **2,650 square kilometres**, down from **4,000 square kilometres** during the same period last year. This year's **data includes a 41 per cent plunge in alerts for June**, which marks the start of the dry season when deforestation tends to jump.

Source of the data:

- The **deforestation data** comes from a system called **Deter**, managed by the **National Institute for Space Research**, a federal agency. It is an **initiative** mainly focused on **detecting real-time deforestation**. The most accurate deforestation calculations come from another system called **Prodes**, with data released only annually.

Why has deforestation increased in Amazon?

- The former far-right leader **Jair Bolsonaro** weakened environmental authorities while his insistence on the **development of the Amazon region** resonated with land grabbers and farmers who had long felt maligned by environmental laws.
- Many **Ibama agents** retired and weren't replaced during Bolsonaro's administration. **Ibama** is a **Brazilian authority** that takes on tasks comparable to those of the **German Federal Environment Agency**.
- Thousands of illegally raised cattle within embargoed areas. Bolsonaro openly criticized Ibama and advocated for the legalization of deforested areas.
- Experts say the mere expectation that a land-grabbed area will eventually be regularized has historically been one of deforestation's biggest drivers. They were emboldened, and **Amazon deforestation surged to a 15-year high**.

Forest fires in Amazon:

- According to satellite monitoring, there were **3,075 fires in the Amazon** in June alone, which marks the beginning of the dry season — the **most since 2007**.
- The jump is due to the **clearing of areas deforested in the second half of 2022**. In the **Amazon**, fires are mostly **man-made** and **occur after clear-cutting of the forest**.
- With **El Niño looming**, which **typically brings less rain and higher temperatures to the Amazon**, **Ibama** has **doubled its budget for fighting forest fires** and increased the scope of its fire squads by **17 per cent** for the most critical period, typically July to October. Approximately half of the **2,117 temporary firefighters are Indigenous peoples**.

Steps taken by the present government to restore the Amazon forests:

- The **Amazon rainforest covers an area twice the size of India** and holds **tremendous stores of carbon**, serving as a **crucial buffer against climate change**. **Two-thirds** of it is located in **Brazil**.
- Lula has promised to **end net deforestation in Brazil's Amazon by 2030**. His four year mandate, his third term, ends two years earlier. **Lula (present President of Brazil)** campaigned last year with pledges to rein in **illegal logging** and **undo the environmental devastation** during Bolsonaro's term.
- Whereas **Bolsonaro openly criticized Ibama and advocated for the legalization of deforested areas**, **Lula** has said **he will rebuild law enforcement and promised to**

expel invaders from protected areas. Lula has committed to restoring the workforce in Ibama.

Working of Ibama:

- **Ibama has strengthened remote surveillance**, where **deforestation is detected through satellite imagery**. By **cross-referencing with land records**, it is possible to **identify the owner of the area** in many cases, leading to an **embargo that restricts access to financial loans** and imposes other sanctions.
- Another **strategy** has been to **seize thousands of illegally raised cattle within embargoed areas**. It is effective because it inflicts immediate punishment, whereas fines are rarely paid in Brazil due to a slow appeals process.

What more is needed?

- It is necessary to **invest in sustainable productive chains under community management**, such as **managed pirarucu (arapaima) fishing, Brazil nuts, vegetable oils, and açai**.
- This will help revitalize and expand these chains, generating decent income for those engaged in conservation efforts within their territories. Ibama's Agostinho also stressed his agency's efforts within Indigenous territories, particularly the **land of the Yanomami people** where thousands of **illegal gold miners** — seeking to carve out a living — invaded during Bolsonaro's term.
- Their activities **contaminated waterways and sickened local people**, and Lula's government has spent months expelling most of them. Some remain, however, working at night to avoid being caught.

About Amazon rainforest:

- The **Amazon rainforests cover about 80 per cent** of the basin and as per **NASA's Earth observatory**, they are home to nearly a **fifth of the world's land species** and is also home to **about 30 million people** including **indigenous groups** and several isolated tribes.
- The **Amazon basin** is huge with an area covering **over 6 million square kilometres**, it is nearly **twice the size of India**. The **Amazon forests** have absorbed **CO₂** from the atmosphere, helping to moderate the global climate

- The basin produces **about 20 per cent** of the world's flow of freshwater into the oceans. Over the last few years, the forest has been under threat due to deforestation and burning. Forest fires, have doubled since 2013.

Topic 3. GOVT TO MAKE INDIA A GLOBAL HUB FOR 'CIRCULAR TEXTILES'

Important for the subject: Environment

Government has initiated work on **drafting policies** to make India a global hub for **sourcing sustainable and circular textiles and garments**.

- The Textiles Ministry is set to start the **mapping of the textile waste value chain** in India with the aim to position the country as a global hub for circular textiles. It seeks to do so by establishing **textile recycling clusters**
- Regulatory framework to be developed on **circularity in major export destinations** and competitor countries that could have an impact on India's exports of textiles

What is 'circularity' in textiles value chain?

- Circularity aims to shift from the **"take-make-dispose"** linear value chain into a circular system, where materials are not lost after use but remain in the economy, **circulating as long as possible at the highest possible value**, according to the United Nations Environment Programme.
- It is estimated that the extent of textile-to-textile waste recycling is less than 1 per cent.

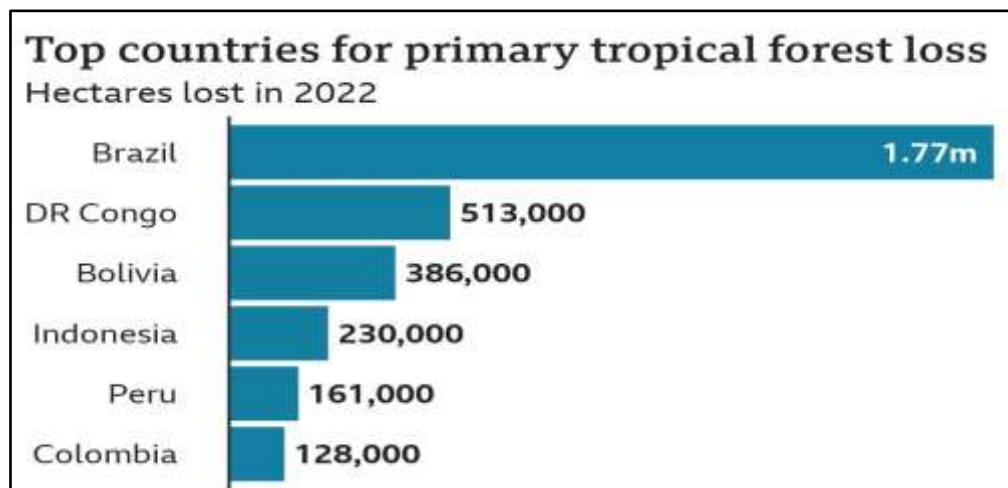
Why important?

- With the EU and other major textile markets initiating strategies to transition towards sustainable and recyclable textiles, it is imperative to avoid being unprepared and left behind.
- **European Union's Circular Economy Action Plan** includes the 'EU strategy for sustainable and circular textiles' under which by 2030 all textile products placed on the EU market have to be **durable, repairable, and recyclable**.
- They will, to a great extent, have to be made of **recycled fibres, free of hazardous substances, produced in respect of social rights and the environment**, as per the strategy.
- The government hopes to more than double India's textiles exports to \$100 billion over

the next 5-6 years. In view of this India cannot afford to lose major markets like the EU, due sustainability measures.

Topic 4. GLOBAL TROPICAL PRIMARY FOREST COVER CONTINUED DECLINE IN 2022

Important for the subject: Environment



According to research by **World Resources Institute's (WRI) Global Forest, Tropical areas** lost **4.1 million hectares** of forest cover – equivalent to losing an area of **11 football fields** per minute – in 2022.

This **forest loss** produced **2.7 billion tonnes of carbon dioxide emissions**, which is around the same as **India's annual emissions** due to the combustion of fossil fuels. Primary forest cover loss in tropical areas in 2022 was 10% more than in 2021.

Primary forests:

- **Primary forests** are some of the **densest, wildest** and most **ecologically significant** forests on Earth. They are **mature, natural forests** that have **remained undisturbed** in recent history.
- They span the globe, from the **snow-locked boreal region** to the **steamy tropics**, though **75% of them can be found in just seven countries**. Primary forests comprise an estimated **26%** of the world's natural forests. They often **store more carbon** than other forests and are **rich sources of biodiversity**.
- **Primary forest loss is almost irreversible in nature:** even if the green cover regrows, a

secondary forest is unlikely to match the extent of biodiversity and carbon sequestering capabilities of a primary forest.

Findings of the Global Forest Watch:

- The world is not on track to meet most of its forest-related commitments. In **2022**, although the **global deforestation rate was 3.1% lower** than the baseline from **2018-2020**, it was still over **one million hectares above** the level needed.
- To **meet the target of restoring 350 Mha of forests globally by 2030**, the world needs to **increase tree cover by 22 Mha per year**, between **2021 and 2030**.
- Despite registering some gains, the **overall change in tree cover in the last 20 years was a net loss of 100 Mha**. This means that we are still losing forests and not restoring them at the required rate.

Country-wise assessment:

- **Brazil** and the **Democratic Republic of Congo** are the two countries with the **most tropical forest cover** and both **registered losses of this resource in 2022**.
- **Ghana** and **Bolivia** also **rapidly lost their primary forest cover**. **Indonesia** and **Malaysia** managed to keep their **primary forest cover loss to record-low levels in 2022**

Causes of destruction:

- Increased population led to increased demand for food
- Expansion area under agriculture
- Encroachment of land under primary forests
- Shifting cultivation
- Forest fires

Consequences:

- Forest loss in the Amazon basin not only affects carbon but also regional rainfall. It may eventually lead to a **tipping point** that, if crossed, could **convert most of the ecosystem into a savanna**.

India's situation:

- According to **Global Forest Watch**, **India lost 43.9 thousand hectares of humid**

primary forest between **2021** and **2022**, which accounts for **17%** of the country's **total tree cover loss** in the period.

- The **total tree cover loss** in India between **2021** and **2022** was **255 thousand hectares**. The **total global tree cover loss** in **2022** declined by **10%**. This includes **primary, secondary, and planted forests**.
- This **decrease** is a direct result of a decrease in **fire-related forest losses** which decreased **28%** from 2021. **Non-fire losses** in **2022** increased by slightly less than 1%.

Global Forest Watch (GFW):

- **Global Forest Watch (launched 2014)** is an **open-source web application to monitor global forests in near real-time**.
- **GFW** is an **initiative of the World Resources Institute**, with partners including **Google, USAID, the University of Maryland, Esri, Vizzuality** and many other academic, non-profit, public, and private organizations.

World Resources Institute:

- **WRI** is a **global research organization** that spans more than **50 countries** and focuses on **six critical issues** at the intersection of environment and development: climate, energy, food, forests, water, and cities and transport. It was **established in 1982**. Headquartered in **Washington, US**.

Topic 5. IN VARANASI, TURTLES HELP CLEAN THE GANGA

Important for the subject: Environment

Since 2014, the Namami Gange Programme has been working to clean and rejuvenate the Ganga river network, and marine life, particularly turtles, has played a crucial role. The Wildlife Institute of India (WII) and the Ministry of Forest, in collaboration with the **National Mission for Clean Ganga**, have been **running a turtle breeding and rehabilitation centre in Varanasi, Uttar Pradesh, since 2017**.

The Namami Gange Programme aims to clean the Ganga River network and rejuvenate it.

Turtles:

- Turtles can be predators or prey. They can be herbivores, omnivores and carnivores. They

can be specialists, feeding on a few food sources, like the leatherback sea turtle (*Dermochelys coriacea*) that eats almost exclusively jellyfish.

- Or they can be generalists, feasting on a wide variety of food, like slider turtles that eat just about anything. Turtles and their eggs are important prey to a wide variety of predators. These reptiles graze, they dig burrows, they disperse seeds, they create and modify habitats, and they affect food webs and mineral cycling. Losing these animals can be disastrous.
- The Wildlife Institute of India (WII) and the Ministry of Forest, in collaboration with the National Mission for Clean Ganga (NMCG), established a turtle breeding and rehabilitation centre in Varanasi in 2017.

Turtle Rehabilitation Centre:

- The centre releases turtles into the river to support the Namami Gange Programme. Approximately 5,000 turtles have been released since 2017, and another 1,000 will be released this year to strengthen the program.
- The centre has released over 40,000 turtles into the river since its establishment in the late 1980s under the Ganga Action Plan. The Namami Gange Programme brought renewed attention to the centre in 2014.

Turtle Breeding Process:

- The Forest and Wildlife Department collects turtle eggs from coastal areas in the Chambal region. The eggs are monitored for 70 days and placed in a specially adapted room for hatching.
- The eggs are buried in sand-filled wooden boxes, with each box containing 30 eggs. Hatching occurs between June and July at temperatures ranging from 27 to 30 degrees Celsius.
- The turtles are then monitored in an artificial pond for two years before being released into the river.

Turtles' Role in Water Quality Improvement:

- Turtles contribute to cleaning the river by consuming meat and waste products.
- Freshwater turtles are known for their ecosystem services like keeping rivers, ponds and freshwater sources clean by eating algal blooms and scavenging on dead matter.

Freshwater turtles play an important role in being predators as well as the prey.

- They control invasive fishes by eating them, and at the same time, they are an important source of protein for a lot of animals that feed on turtle eggs and juvenile turtles,”
- They are scavengers, also sometimes known as “vultures of the aquatic ecosystem keeping the ecosystem clean and an important part of the aquatic food chain. A healthy pond ecosystem usually has a flapshell or some kind of freshwater turtle.
- River water quality checks have shown improvements in biochemical oxygen demand (BOD), fecal coliform (FC), and dissolved oxygen (DO) levels. PH assessments have indicated suitable water quality for bathing.
- Improved DO, BOD, and FC levels have been observed at various locations along the river.

What is Turtle Survival Alliance:

- The Turtle Survival Alliance (TSA) was **formed in 2001** as an **International Union for Conservation of Nature (IUCN) partnership** for sustainable **captive management of freshwater turtles and tortoises.**
- The TSA arose in response to the rampant and unsustainable harvest of Asian turtle populations to supply Chinese markets, a situation known as the **Asian Turtle Crisis.**

Mission: ‘Zero Turtle Extinctions in the 21st Century’. Status of Turtle in India:

- India has **29 species of freshwater turtles (24) and tortoises (5).** More than **half of the turtle species are threatened and 11 are protected under Schedule I of The Wildlife Protection Act,** enjoying the same protection as tigers.
- The three **critically endangered turtles** are being conserved **as a part of TSA India’s research,** conservation breeding and education programme in different parts of the country.
- **The Northern River Terrapin** (Batagurbaska) is being conserved at the **Sunder bans; The Red-crowned Roofed Turtle** (Batagurkachuga) at **Chambal; The Black Soft shell Turtle** (Nilssonina nigricans) at different temples in.

What is the difference between Turtle and Tortoise:

- The main difference between the two is that **turtles are primarily aquatic** whereas

tortoises are terrestrial and spend more time on land.

What is Wildlife Crime Control Bureau?

- The Wildlife Crime Control Bureau is a **statutory multi-disciplinary body under the Mo EFCC created in 2007** under the provisions of the **Wildlife Protection Act 1972**. Wildlife Crime Control Bureau is **designated nodal agency for CITES related enforcement**.
- The Bureau has its **five regional offices at Delhi (headquarters), Kolkata, Mumbai, Chennai and Jabalpur**; and **five border units at Ramanathapuram, Gorakhpur, Motihari, Nathula and Moreh**.
- It has received the **Asia Environmental Enforcement Award-2020** awarded by the **United Nations Environment Programme (UNEP)**.

Under the Wild Life (Protection) Act, 1972, WCCB is **mandated** to:

- **Collect and collate intelligence** related to organized **wildlife crime**; Disseminate the same to State and other enforcement agencies so as to **apprehend the criminals**;
- To **establish a centralized wildlife crime data bank**; **Coordinate actions by various agencies** in connection with the enforcement of the provisions of the Act; **Assist international organizations** & foreign authorities to facilitate wildlife crime control;
- **Capacity building** of the wildlife crime enforcement agencies; **Assist State Governments to ensure success in prosecutions** related to wildlife crimes; and **Advise the Government of India** on issues relating to **wildlife crimes**.
- It also **assists and advises the Customs authorities** in **inspection of the consignments of flora & fauna** as per the provisions of **Wild Life Protection Act, CITES and EXIM Policy** governing such an item.

Various Wildlife Crime Control Bureau (WCCB) led operations:

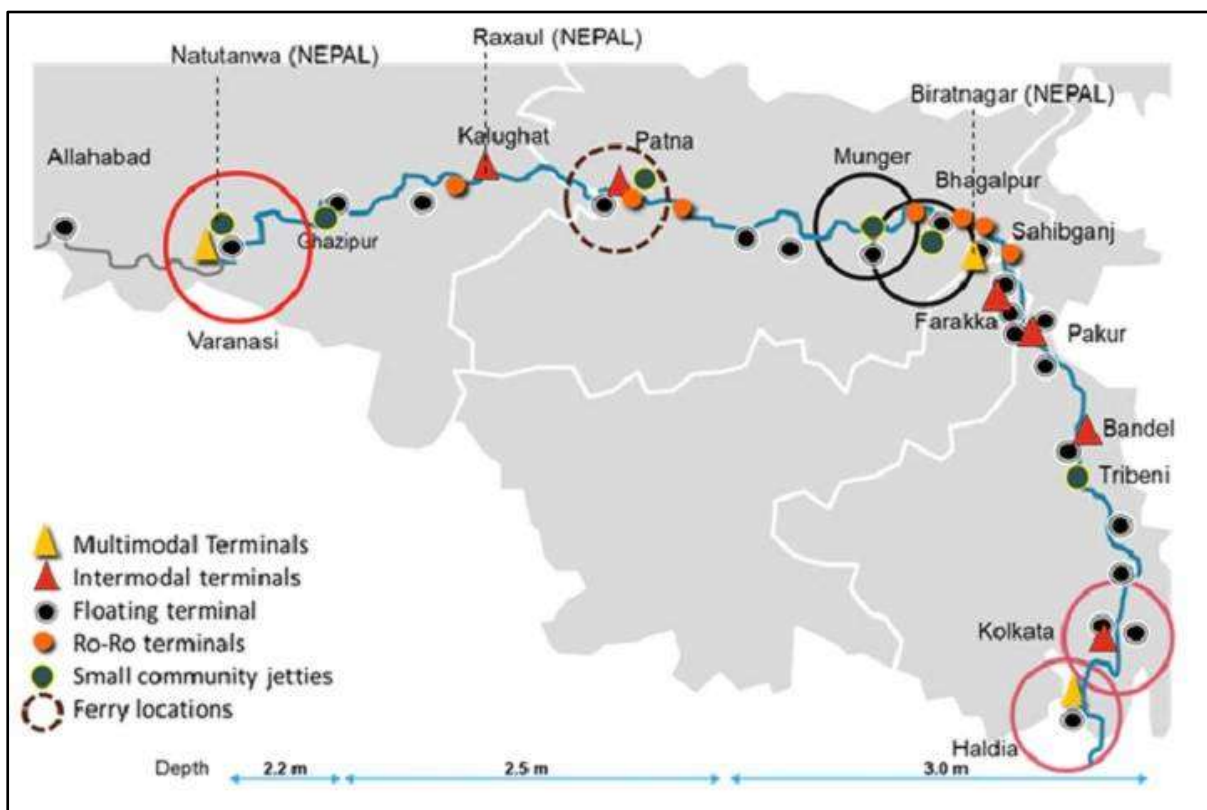
- Operation “**Save Kurma**” to focus on the **poaching, transportation and illegal trade of live turtles and tortoises**.
- “**Operation Turtshield- I**” and “**Operation Turtshield-II**” were taken up to **tackle the illegal trade of live turtles**.
- Operation “**Les know**”, “**Les know-II**” and Operation “**Les know-III**” to gain **attention of enforcement agencies** towards the **illegal wildlife trade** in lesser-known

species of wildlife.

- **Operation Clean Art** to drag attention of enforcement agencies towards illegal wildlife trade in Mongoose hair brushes.
- **Operation Soft gold** to tackle Shah toosh Shawl made from Chiru wool illegal trade and to spread awareness among the weavers and traders engaged in this trade.
- **Operation Birbil** to curb illegal trade in wild cat and wild bird species. **Operation Wild net, Operation Wild net-II, Operation Wild net-III and Operation Wild net-IV** to draw the attention of the enforcement agencies within the country to focus their attention on the ever increasing illegal wildlife trade over internet using social media platforms.
- **Operation Free fly** on illegal trade of live birds **Operation Wet mark** to ensure prohibition of sale of meat of wild animals in wet markets across the country

Topic 6. ARTH GANGA REJUVENATION

Important for the subject: Environment



Namami Gange Program (NGP):

Namami Gange is an **integrated river rejuvenation program** not just to **clean** River Ganga but **restore** its entire riverine ecosystem. It is being operated under the Department of Water Resources, River Development and Ganga Rejuvenation, **Ministry of Jal Shakti**.

- The program is being implemented by the **National Mission for Clean Ganga (NMCG)**, and its state counterpart organizations i.e. **State Program Management Groups (SPMGs)**.
- **NMCG** is the implementation wing of the **National Ganga Council** (set in 2016; which replaced the **National Ganga River Basin Authority – NGRBA**). It has an **Rs. 20,000-crore**, centrally-funded, non-lapsable corpus and consists of nearly 288 projects.

Namami Gange is premised on the **five important pillars of –**

- **Nirmal Ganga** (unpolluted river), **Aviral Ganga** (unrestricted flow), **Jan Ganga** (People's Participation), **Gyan Ganga** (knowledge and research-based interventions) and **Arth Ganga** (people-river connect through the bridge of economy).

Efforts made under the NGP:

- 193 projects worth ₹30,797 crore have been sanctioned for Sewage infrastructure. Hybrid Annuity Model and One-City-One-Operator approach for enhancing the efficiency of the project.
- Efforts to prevent the flow of **industrial effluents** and even **solid waste** into the river.

Arth Ganga:

- **Arth Ganga** is an initiative that strives to boost the economy and livelihood in the Ganga Basin. **Arth Ganga** is a sustainable economic model conceptualized under **Namami Ganga Program** to **integrate people in the basin with Ganga Rejuvenation**. Arth Ganga was espoused by the Prime Minister during the first meeting of the **National Ganga Council (NGC)** in **Kanpur** in **2019**.

Since **January 2022**, multi-sectoral interventions in the **six key identified verticals** are being made under Arth Ganga. These include

1. Zero Budget Natural Farming,
2. Monetization of Reuse of Sludge & Wastewater,

3. Livelihood Generation,
4. Cultural Heritage and Tourism,
5. Public Participation and
6. Institution Building.

Efforts made under the program:

- Promotion of natural farming in the Ganga basin ‘Sahakar Ganga Grams’ are being set up.
- Ranching of **81 lakh Indian Major Carps**, including **Rou fish, 8000 Mahseer** and **90000 Hilsa** has resulted in considerable **improvement in the daily income of the fishermen community**.
- Ministerial collaboration on the promotion of the reuse of treated wastewater. Release of the ‘**National Framework for Safe Reuse of Treated Water**’ is further strengthening the mechanisms.

JALAJ:

- **JALAJ is a unique initiative** developed to generate **livelihood opportunities** for local communities through **shops, awareness boats (Jalaj Safari), home stays etc.** JALAJ has been launched at **40 locations** so far.

National Ganga Council:

- The **National Ganga Council** is chaired by **Prime Minister**. The **National Ganga Council** is formed under the **Environment (Protection) Act (EPA), 1986**.
- It has been given overall responsibility for the superintendence of pollution prevention and rejuvenation of River Ganga Basin, including Ganga and its tributaries.
- **National Mission for Clean Ganga (NMCG)** acts as an implementation arm of the **National Ganga Council**. NMCG was established in the year **2011** as a registered society. It has a **two-tier management structure** and comprises of **Governing Council** and Executive Committee.

The aims and objectives of NMCG are:

- To ensure effective control of pollution and rejuvenation of the river Ganga by adopting a river basin approach to promote inter-sectoral coordination for comprehensive planning and management.

- To maintain minimum ecological flows in the river Ganga with the aim of ensuring water quality and environmentally sustainable development.

National Mission for Clean Ganga (NMCG):

- The **National Mission for Clean Ganga (NMCG)** is implemented by the **National Council for Rejuvenation, Protection and Management of River Ganga** also known as the **National Ganga Council**. This mission was established on **12th August 2011** under the **Societies Registration Act, 1860** as a registered society.

Objectives:

- The mission incorporates rehabilitating and boosting the existing **STPs (Sewage Treatment Plants)** and **instant short-term steps to curb pollution at exit points** on the riverfront in order to check the inflow of sewage.
- To maintain the continuity of the water flow without changing the natural season variations. To restore and maintain the surface flow and groundwater. To regenerate and maintain the natural vegetation of the area.
- To conserve and regenerate the aquatic biodiversity as well as the riparian biodiversity of the river Ganga basin.
- To allow participation of the public in the process of protection, rejuvenation and management of the river.

Topic 7. MEMBERSHIP FOR GLOBAL BIOFUEL ALLIANCE TO BE OPENED UP ON JULY 22: H S PURI

Important for the subject: Environment

The **Global Biofuel Alliance (GBA)**, which is backed by the **US, Brazil and India**, will be opened up for membership from other countries on July 22 during the **G20's Energy Transition Ministerial Meeting (ETMM)** in Goa.

- **India, the US and Brazil** account for a total of **85 per cent** of the **global ethanol production** with the **US holding 55 per cent** share followed by **Brazil (27 per cent)** and **India (3 per cent)**.

Global Biofuels Alliance (GBA):

Established by: India, Brazil and the US.

- **Aim:** To facilitate cooperation and intensify the use of **sustainable biofuels**, including in the **transportation sector**.
- The **alliance** will place emphasis on strengthening markets, facilitating global biofuels trade, development of concrete policy lesson-sharing and provision of technical support for national biofuels programs worldwide. It will also emphasize the already implemented best practices and success cases.
- The **Alliance shall work** in collaboration with and complement the relevant existing regional and international agencies as well as **initiatives in the bioenergy, bioeconomy, and energy transition fields** more broadly including the **Clean Energy Ministerial Biofuture Platform, the Mission Innovation Bioenergy initiatives and Global Bioenergy Partnership (GBEP)**.

GBA membership:

- Membership to the alliance is also open for interested countries beyond G-20 as well. The **GBA** will also be a competent organisation which will **set technical standards for Sustainable Aviation Fuel (SAF) business** in collaboration with relevant industry bodies.
- The GBA will be having a **three-category membership structure** bringing together **member countries, partner organizations and industries**.

Global Bioenergy Partnership (GBEP):

Founded in: 2006

- **Purpose:** GBEP brings together public, private and civil society stakeholders in a joint commitment to promote bioenergy for sustainable development.

Focus areas: The Partnership focuses its activities on three strategic areas:

- Sustainable Development – Climate Change – Food and Energy Security **India** is one of the **observer countries**.

What are Biofuels?

- Any hydrocarbon fuel that is **produced from an organic matter** (living or once living

material) in a short period of time (days, weeks, or even months) is considered a biofuel.

Biofuels may be solid, liquid or gaseous in nature.

- **Solid:** Wood, dried plant material, and manure
- **Liquid:** Bioethanol and Biodiesel
- **Gaseous:** Biogas

Classification of biofuels:

Biofuel Description

1st generation biofuels

- Any biofuel made from a feedstock that can also be consumed as human food is considered a **first-generation biofuel**. They are also called **conventional biofuels**. Made from things like **sugar, starch, or vegetable oil**. Note that these are **all food products**.

2nd generation biofuels

- They are produced from **sustainable feedstock**. The sustainability of a feedstock is defined by its availability, its impact on greenhouse gas emissions, its impact on land use, and by its potential to threaten the food supply.
- **No second-generation biofuel is also a food crop**, though certain food products can become **second-generation fuels** when they are no longer useful for consumption. Second-generation biofuels are often called “**advanced biofuels**.”

3rd generation biofuels

- They are derived from **algae**. These biofuels are given their own separate class because of their unique production mechanism and their potential to mitigate most of the drawbacks of **1st** and **2nd** generation biofuels.

4th generation biofuels

- In the production of these fuels, **crops that are genetically engineered** to take in **high amounts of carbon** are grown and harvested as biomass. The crops are then converted into fuel using **second-generation techniques**.

History of ethanol blending in India

- Since 2001, India has tested the feasibility of ethanol-blended petrol whereby 5% ethanol blended petrol was supplied to retail outlets.
- In 2002, India launched the Ethanol Blended Petrol (EBP) Programme and began selling 5% ethanol blended petrol in nine States and four Union Territories that was extended to twenty States and four UTs in 2006. Until 2013-14, however, the percentage of blending never crossed 1.5%.
- In 2015, the Ministry of Road Transport and Highways notified that E5 [blending 5% ethanol with 95% gasoline] petrol and the rubber and plastic components used in gasoline vehicles produced since 2008 be compatible with the E10 fuel. In 2019, the Ministry notified the E10 fuel [blending 10% ethanol with 90% gasoline].
- The rubber and plastic components used in petrol vehicles are currently compatible with E10 fuel.
- Standards for E20, E85 and even E100 fuel have already been laid. This includes standards for ethanol blended diesel. Since 2020, India has been announcing its intent to achieve 10% blending by the end of 2022 and 20% blending by 2030. The Centre has also targeted 5% blending of biodiesel with diesel by 2030.
- **Effect on Indian Reserves** India's net import of petroleum was 185 million tons at a cost of \$55 billion in 2020- 21. Most of the petroleum is used by vehicles and therefore a successful 20% ethanol blending program could save the country \$4 billion per annum, or about ₹30,000 crore.
- India's current ethanol production capacity consists of 426 crore litres from molasses-based distilleries, and 258 crore litres from grain-based distilleries. This is expected to increase to 760 crore litres and 740 crore litres respectively and would suffice to produce 1016 crore litres of ethanol required for EBP and 334 crore litres for other uses.

Effect on engines

- When using E20, there is an estimated loss of 6-7% fuel efficiency for four wheelers which are originally designed for E0 and calibrated for E10, 3-4% for two wheelers designed for E0 and calibrated for E10 and 1-2% for four wheelers designed for E10 and calibrated for E20.

Environmental costs of ethanol blending

- Because ethanol burns more completely than petrol, it avoids emissions such as carbon monoxide. However, tests conducted in India have shown that there is no reduction in nitrous oxides, one of the major environmental pollutants.
- For India, sugarcane is the cheapest source of ethanol. On average, a ton of sugarcane can produce 100 kg of sugar and 70 litres of ethanol but that would mean 1,600 to 2,000 litres of water to produce 1 kg of sugar, implying that a litre of ethanol from sugar requires about 2,860 litres of water.

Topic 8. NOT TIGERS, WE ARE BEING TARGETED BY POACHERS NOW: SIMILIPAL RESERVE STAFF

Important for the subject: Environment

About Similipal National Park:

Similipal is a **tiger reserve in the Mayurbhanj district** in the Indian state of Odisha. It is **part of the Mayurbhanj Elephant Reserve**, which includes three protected areas - Similipal Tiger Reserve, Hadgarh Wildlife Sanctuary and Kuldiha Wildlife Sanctuary.

- Similipal National Park **derives its name from the abundance of red silk cotton trees** growing in the area.
- The vast terrain of Similipal with wide altitudinal, climatic and topographic variations, criss-crossed by large number of perennial streams, harbours a **unique blend of Western Ghats, Eastern Ghats and Sub-Himalayan plant species**.
- The floristic composition indicates a **connecting link between South Indian and North Eastern Sub-Himalayan Species**. Forest is **predominantly moist mixed deciduous forest** with **tropical semievergreen forest in areas** with suitable microclimatic conditions and sporadic patches of dry deciduous forests and grasslands. It forms the **largest watershed of northern Odisha**.
- It holds the **highest tiger population in Odisha**, and harbours the **only population of melanistic tigers in the world**.
- Other carnivores found here are **leopard, leopard cat, fishing cat, jungle cat and wolf**. The active **management of mugger** has revived its population on the banks of the rivers Khairi and Deo.

- Similipal Tiger Reserve is also **home to the largest population of elephants in Odisha**. This protected area is **part of the UNESCO World Network of Biosphere Reserves** since 2009.

About Elephants:

- **India** is the **natural home of the largest population of Asian elephants**. It is also found in **Nepal, Bangladesh, Bhutan and Myanmar**.
- **International Union for Conservation of Nature (IUCN): Asian Elephant-Endangered Convention of the Migratory species (CMS): Appendix I Wildlife (Protection) Act, 1972: Schedule I**

Topic 9. SCIENTISTS SAY THE ‘ANTHROPOCENE EPOCH’ BEGAN IN THE 1950S: WHAT IT MEANS, SIGNIFICANCE

Important for the subject: Environment

In a major development that could change the **Earth’s official geological timeline**, geologists have said **sediments at Crawford Lake in Canada’s Ontario** have provided evidence of the beginning of the **Anthropocene epoch** — a proposed geological epoch that began when human activity started to have a significant impact on the Earth.

- **Anthropocene Working Group (AWG)** have estimated that the **new epoch started sometime between 1950 and 1954**.
- They revealed the findings after analysing the **lake’s bottom sediments**, which have over the years **captured the fallouts of large-scale burning of fossil fuels, explosion of nuclear weapons and dumping of plastic and fertilisers on land and in water bodies**.
- The data show a **clear shift from the mid-20th century**, taking **Earth’s system beyond the normal bounds of the Holocene** (the epoch that started at the end of the **last ice age 11,700 years ago**).

Anthropocene Working Group (AWG):

- It is a group of geologists who have been working since **2009** to make the **Anthropocene part of the planet’s time scale**.

What is the Anthropocene epoch?

- The term was first coined by **Nobel Prize-winning chemist Paul Crutzen** and **biology professor Eugene Stoermer** in **2000**. It denotes the **present geological time interval**, in which the **Earth's ecosystem** has gone through **radical changes due to human impact**, especially since the onset of the Industrial Revolution.

There are numerous phenomena associated with this epoch, such as:

- Global warming, Sea-level rise, Ocean acidification, Mass-scale soil erosion, the advent of deadly heat waves, Deterioration of the biosphere and other detrimental changes in the environment.
- Many of these changes will persist for millennia or longer and are **altering the trajectory of the Earth System**, some with **permanent effect**.
- They are being reflected in a distinctive body of geological strata now accumulating, with the potential to be preserved into the far future.

What have the geologists found?

- The **79 feet deep** and **25,800 square-foot-wide Crawford Lake** was chosen for examination as its layers of sediment preserved the **annual impact of human activities on the Earth's soil, atmosphere and biology**. There are **distinct and multiple signals** starting around **1950** in the **water body**, which showed that **“the effects of humans overwhelm the Earth system”**.
- The **presence of plutonium** (due to the detonation of nuclear weapons) gives a stark indicator of when humanity became such a dominant force that it could leave a **unique global fingerprint' on our planet**.
- **Approval:** A final approval might come at the **37th International Geological Congress** in **Busan, South Korea**, which will take place next year

Earth's geological time:

- The modern geologic time scale was formulated in **1911** by **Arthur Holmes**. A representation of time based on Earth's rock record is called the geologic time scale.

The planet's geological time scale is divided into **five broad categories:**

1. Eons,
2. Epochs,

3. Eras,
4. Periods,
5. Ages.

- While **eon** is the **broadest category of geological time**, **age is the smallest category**.
- Each of these categories is **further divided into sub-categories**. For instance, **Earth's history is characterised by four eons**, including **Hadeon (oldest)**, **Archean**, **Proterozoic**, and **Phanerozoic (youngest)**. As of now, we're in the **Phanerozoic eon**, **Cenozoic era**, **Quaternary period**, **Holocene epoch** and the **Meghalayan age**.

On what basis these categories are divided?

- According to the **New York-based Paleontological Research Institution**, a variety of event categories are used to determine the division dates of the numerous eons, eras, periods, epochs, and ages. These occasion categories comprise, but are not restricted to:
- **The first occurrence of a species:** All biological forms are included in this (plants, animals, bacteria, etc). The “first of first” species are of particular interest (e.g., the first oxygen-breathing organism, the first seed-producing plant, and so on).
- **Key species going extinct or catastrophic extinctions:** A huge number of species going extinct in a short period of geologic time is known as a mass extinction. The Cretaceous-Paleogene extinction event, when most dinosaur species became extinct, is a well-known illustration of mass extinction.
- **Major worldwide climate shifts:** when the climate significantly diverges from the average for the time, as during ice ages.
- **Super continental formation and/or breakup:** When all significant landmasses on the surface of the Earth combine to form one landmass, supercontinents are created.
- **Catastrophic events:** Major catastrophes can result in or set off other occurrences like extinctions and climate change. Major floods, meteorite impacts, and volcanic eruptions are examples of catastrophic catastrophes.
- **Global magnetic polarity shifts:** The planet's magnetic polarity “flips” on an irregular basis, with the North pole switching places with the South pole.

Topic 10. EU PARLIAMENT BACKS BIODIVERSITY BILL IN A CLOSE VOTE

Important for the subject: Environment

The **European Parliament** on July 12, narrowly backed a **key biodiversity bill** aimed at **rewilding EU land and water habitats**, overcoming a backlash by conservative lawmakers who said it would hurt farmers.

About the ‘Nature Restoration Act’:

- The **Nature Restoration Act**, initiated by the **European Commission**, aims to resuscitate degraded ecosystems by **boosting forested areas, marine habitats** and **increasing connectivity between rivers**.
- The **nature restoration law** will place recovery measures on **20%** of the **EU’s land and sea by 2030**, rising to cover all degraded ecosystems by **2050**.
- It notably seeks to grow populations of **bees, birds** and **butterflies** — especially on **farmland**, which would also be encouraged to bring **back marsh–** and **peatlands** previously drained.

Why is the law needed?

- Europe’s nature is in bad health. More than **60%** of its soils are unhealthy and **81%** of habitats are in poor condition.
- A recent study found the abundance of farmland birds has halved in the past **40 years**.

Controversy over the bill:

- According to the **conservative European People’s Party (EPP)**, it would **reduce EU food security**, punish producers reeling from the pandemic and energy crisis and **limit possibilities to build wind and hydroelectric energy facilities**.
- Less land for farmers, less sea for fishermen, less activity for businesses, and fewer European products and jobs for our citizens A non-governmental organization lobbying for maritime environmental protections, **Seas At Risk**, also criticized the bill.

Seas at Risk:

- Seas At Risk is an **association of environmental organizations** from across Europe, working together to **ensure that life in our seas and oceans is abundant, diverse,**

climate resilient, and not threatened by human activities.

- Its **mission** is to **promote ambitious policies for marine protection at European and international level.**
- With over **30 members** representing the majority of European countries, **Seas At Risk** speaks for millions of citizens that care deeply about the health and well-being of seas and oceans.
- **Headquartered in Brussels.**

Topic 11. SURAJ: EIGHTH CHEETAH DIES AT KUNO NATIONAL PARK

Important for the subject: Environment

An eighth cheetah, a male named **Suraj** was found dead on the morning of July 14, 2023, at the **Kuno National Park (KNP).**

- The **primary investigation** found the **cause of death to be due to injuries on the neck and back.** A detailed understanding and actual details will be known after an autopsy. **Extreme wet conditions** are causing the collars worn by the animals to create infections. Both **Tejas** and **Suraj** died of **septicemia.**
- **Earlier, six cheetahs** including **Agni** (male), **Sasha** (female died due to renal failure), **Uday** (due to cardiac failure), and **Daksha** (female) had died. **Eight cheetahs** from **Namibia** and **12 cheetahs** from **South Africa** were introduced in the KNP.
- On March 29, **Jwala**, a female from **Namibia**, gave birth to a litter of **four cubs.** Three have died since then.

Eight Cheetahs from Namibia are:

- The male cheetahs are named **Freddie, Elton** and **Oban**, while the female cheetahs are named **Siyaya, Aasha, Tbilisi, Sasha** and **Savannah.** Namibian cheetahs **Tbilisi, Siyaya, Savannah** and **Oban** are now named **Dhatri, Jwala, Nabha** and **Pawan.**

African Cheetah

IUCN status – Vulnerable

- **CITES status – Appendix-I of the List.** This List comprises of migratory species that have been assessed as being in danger of extinction throughout all or a significant portion

of their range.

- **Habitat** – Around 6,500-7,000 African cheetahs are present in the wild. **Physical Characteristics** – Bigger in size as compared to Asiatic Cheetah. **Asian Cheetah**

IUCN Status – Critically Endangered.

CITES – Appendix I of the list

- **Habitat** – 40-50 found only in **Iran**.
- **Physical Characteristics** – Smaller and paler than the African cheetah. Has more fur, a smaller head and a longer neck. Usually have red eyes and they have a more cat-like appearance.

Kuno National Park:

- It was established, in **1981**, as a wildlife sanctuary in the **Sheopur and Morena districts**. It was also known as **Kuno-Palpur** and **Palpur-Kuno Wildlife Sanctuary**.
- In **2018**, it was given the status of a **National Park**. It is part of the **Khathiar-Gir dry deciduous forests ecoregion**. The protected area is largely a **dry deciduous forest**.

Topic 12. A RADIO WIRELESS SYSTEM BECOMES FORCE MULTIPLIER FOR DISASTER MANAGEMENT TEAM

Important for the subject: Science and technology

- The District Emergency Operation Centre Thrissur, which received information about the missing fishing boat from the Coastal Jagratha Samithi, managed to contact the fishermen through the wireless system that functions in radio frequency.
- Their GPS location was shared with the Coast Guard team from Kochi and they were rescued.
- A **radio wireless system under the Revenue department in Thrissur has been used to effectively coordinate relief and rescue work during floods and natural calamities**.
- The system emerged as a force multiplier and a fallback for the disaster management force when power outages and remoteness render other communication systems defunct.
- Interestingly, a **radio wireless network system** was installed in all districts in the State in 2009. But it was abandoned later due to poor range and lack of proper maintenance.
- The **network of 35-odd amateur radio operators (HAM radio) too can be integrated**

into the system in case of emergency.

- Their service was used for official communication during the Thrissur Pooram when all the mobile services got jammed as lakhs of people gathered in the city.

Radio Access Network

- A **radio access network (RAN)** is the part of a telecommunications system that **connects individual devices to other parts of a network through radio connections**.
- A RAN resides between user equipment, such as a mobile phone, a computer or any remotely controlled machine, and provides the connection with its core network.
- The system, which uses radio frequency, can function even when all other communication links fail. The RAN is a major component of wireless telecommunications and has evolved through the generations of mobile networking leading up to 5G.
- This network platform, similar to how open source software became a game changer in the 1990s, attempts to build telecom radio and base stations using nonproprietary technology.

HAM Radio

- **Amateur radio**, also called ham radio, is a **noncommercial two-way radio communications**. They use many frequency bands across the radio spectrum. HAM radio is a **real-time communication network**. This is much like wireless communication which is quick and transparent.
- Amateur Radio operators set up and operate organized communication networks locally for governmental and emergency officials, as well as non-commercial communication for private citizens affected by the disaster.
- Amateur Radio operators are most likely to be active after disasters that damage regular lines of communications due to power outages and destruction of telephone, cellular and other infrastructure-dependent systems.

Indian Scenario

- According to the **Indian Wireless Telegraphs (Amateur Service) Amendment Rules, 1984**, 'Amateur service' means a service of self-training.
- Inter-communications and technical investigation carried on by Amateurs that is, by persons duly authorized under these rules interested in radio technique solely with a

personal aim and without pecuniary interest.

- It is a **non-commercial radio communication service**. Amateur radio operators are commonly known as hams. The term “Ham radio” is used to describe the hobby of Amateur radio and not the equipment.
- Similarly the term “Ham” is used to describe a radio amateur enthusiast and not the equipment.
- Any citizen of India who is above 12 years of age can become a ham by qualifying in the **Amateurs Station Operators’ examination (ASO)** and obtaining a **valid Amateur wireless telegraph station license**.

Topic 13. NEW VARIETY OF WHEAT

Important for the subject: Science and technology



- The Ludhiana-based institution, which played a pivotal role during the Green Revolution to make India surplus in food grains by developing high-yielding strains, has bred a new wheat variety with high amylose starch content, known to reduce risks of type-2 diabetes and cardiovascular diseases.
- It is called **PBW RS1**, with **RS** being short for **resistant starch** — it won’t cause an immediate and rapid rise in glucose levels.
- The **high amylose and resistant starch**, instead, ensure that glucose is released more

slowly into the bloodstream. The variety has been developed over a period of 10 years by a team of wheat breeders led by Dr V S Sohu, head, department of plant breeding and genetics.

- PAU is the first to combine five novel alleles (genes) affecting resistant starch levels for developing this variety. Earlier, **PAU had released two varieties – PBW Zn1 with high zinc content, and PBW1** Chapati whose flour had premium chapati quality that remained fresh for long – on nutritional lines but none had features as PBW RS1.

Resistant Starch

- Resistant starch (RS) is starch, including its degradation products, that escapes from digestion in the small intestine of healthy individuals.
- Resistant starch occurs naturally in foods, but it can also be added as part of dried raw foods, or used as an additive in manufactured foods.
- Some types of resistant starch (RS1, RS2 and RS3) are fermented by the large intestinal micro biota, conferring benefits to human health through the production of short-chain fatty acids, increased bacterial mass, and promotion of butyrate producing bacteria

Topic 14. CHANDRAYAAN-3 MISSION: WHY ISRO WANTS TO EXPLORE THE MOON'S SOUTH POLE

Important for the subject: Science and technology

CHANDRAYAAN-3: INDIA'S MOONSHOT

Mission objectives

- 1 To demonstrate safe and soft landing on lunar surface
- 2 To demonstrate Rover roving on the moon
- 3 To conduct in-situ scientific experiments

Mission life

Propulsion module	Lander and Rover
3 to 6 months	1 lunar day or -14 Earth days

Components

- 1 Propulsion module
- 2 Lander module
- 3 Rover (inside the Lander)

Weight

Propulsion module	Lander module	Total
2148 kg	1752 kg	3900 kg

Chandrayaan-3 is India's upcoming lunar mission, which **aims to be the world's first mission to soft-land near the lunar south pole.**

Chandrayaan-3 is India's third moon mission and is a follow-up of Chandrayaan-2 (2019) which aimed to land a rover on the lunar South Pole. The Mission will have three major modules- the Propulsion module (will carry the lander and rover configuration till 100 km lunar orbit) Lander module (capability to soft land and deploy Rover) Rover (will carry out in-situ chemical analysis of the lunar surface)

Challenges of landing on the South Pole:

- **Previous spacecraft have mostly landed near the equatorial region of the Moon**, a few degrees latitude north or south of the lunar equator. **Landing near the equator is easier and safer** due to the **hospitable terrain, smooth surface, absence of steep slopes, and ample sunlight** for solarpowered instruments.
- The **lunar south pole, on the other hand, presents a challenging terrain** with **extreme temperatures** and areas that are in **permanent shadow, receiving no sunlight.**

Why ISRO wants to explore the Moon's south pole?

- **Water Resources:** The south pole region is believed to have water molecules in substantial amounts, possibly trapped as ice in the permanently shadowed craters.
- Exploring and confirming the presence of water is essential for future human missions and the potential utilization of lunar resources.
- **Scientific Discoveries:** The extreme environment and the presence of permanently shadowed regions provide a preserved record of the Moon's history and the early Solar System.
- **Clues to Earth's History:** The Moon is thought to have formed from debris generated by a giant impact between a Mars-sized object and the early Earth. By studying the lunar south pole, scientists can gain insights into the materials and conditions that existed during the formation of the Earth-Moon system.
- **Global Collaborations:** ISRO-NASA successfully confirmed the presence of water from the data taken by Chandrayaan-1. Indo-Japan collaboration, LUPEX aims to send a lander and rover to the Moon's south pole around 2024.
- **Technological Advancements:** By undertaking missions to this region, ISRO can

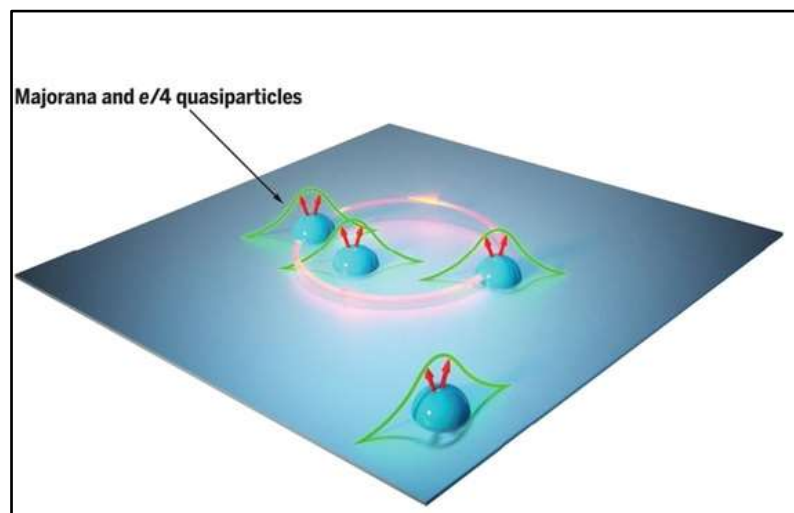
develop and demonstrate innovative technologies for soft landing, navigation, resource utilization, and long-duration operations that can be applied in future space missions.

About LVM3:

- **Launch Vehicle Mark 3 (LVM3)** (previously known as GSLV-MK III) is a three-stage launch vehicle consisting of two solid propellants S200 strap-ons on its sides and a core stage comprising L110 liquid stage and C25 cryogenic stage.
- The vehicle is also dubbed as one of the heaviest for its ability to carry satellites up to 8,000 kg.

Topic 15. STRANGE PARTICLE THAT HOLDS THE KEY TO ‘QUANTUM SUPERCOMPUTERS’

Important for the subject: Science and technology



Microsoft researchers have made significant strides in the creation of **Majorana zero modes**, a type of particle that could revolutionize quantum computing. **Majorana zero modes**, which are **their own antiparticles**, possess **unique properties** that **could make quantum computers more robust** and **computationally superior**.

Majorana Fermions: A conceptual background

- **Fermions and Antiparticles:** All subatomic particles that constitute matter are known as fermions, with each fermion having an associated antiparticle that annihilates upon interaction.

- **Majorana Fermions:** In 1937, Italian physicist Ettore Majorana discovered that certain particles, known as Majorana fermions, can satisfy specific conditions and be their own antiparticles.
- **Neutrinos as Potential Majorana Fermions:** Neutrinos are one type of subatomic particle that scientists speculate may exhibit Majorana fermion behavior, although experimental confirmation is still pending.

Understanding Majorana Zero Modes

- **Quantum Numbers and Spin:** All particles have four quantum numbers, with one called the quantum spin having half-integer values for fermions. This property allows any fermion, even a large entity like an atom, to be classified as a fermion.
- **Bound States and Fermions:** Bound states composed of two particles can also be classified as fermions if their total quantum spin possesses a half-integer value.
- **Majorana Zero Modes:** When these bound states are their own antiparticles and do not readily de-cohere, they are known as Majorana zero modes, which have been sought after by physicists for many years.

Explanation

- In the world of physics, particles can have interesting properties and behave in strange ways. One type of particle that scientists have been studying is called a Majorana particle.
- **Majorana particles** have a special property called “**non-Abelian statistics.**” This property means that when **two Majorana particles come close together, something interesting happens.**
- **Instead of behaving like normal particles, they can combine in a special way** to form a new kind of particle called a **Majorana zero mode.**
- A Majorana zero mode is a very **peculiar particle because it is its own antiparticle.** Normally, particles have antiparticles with opposite properties, like an electron and a positron. But Majorana zero modes are special because they don't have separate antiparticles. **They are their own antiparticles.** Potential Benefits for Computing
- **Enhanced Stability:** Majorana zero modes offer increased stability for qubits, the fundamental units of information in quantum computing. Even if one entity within the bound state is disturbed, the qubit as a whole can remain protected and retain encoded information.

- **Topological Quantum Computing:** Majorana zero modes can enable topological quantum computing, which takes advantage of non-Abelian statistics. These statistics introduce an additional degree of freedom, allowing algorithms to produce different outcomes based on the order in which steps are performed.

Potential Benefits for Computing

- **Enhanced Stability:** Majorana zero modes offer increased stability for qubits, the fundamental units of information in quantum computing. Even if one entity within the bound state is disturbed, the qubit as a whole can remain protected and retain encoded information.
- **Topological Quantum Computing:** Majorana zero modes can enable topological quantum computing, which takes advantage of non-Abelian statistics. These statistics introduce an additional degree of freedom, allowing algorithms to produce different outcomes based on the order in which steps are performed.

Challenges and Future Prospects

- **Creating Majorana Zero Modes:** Scientists have been exploring various setups, such as topological superconductors, to generate Majorana zero modes. However, confirming their existence remains a challenge, as their effects on surrounding materials must be inferred indirectly.
- **Recent Advances by Microsoft Researchers:** Microsoft researchers recently engineered a topological superconductor using an aluminium superconductor and an indium arsenide semiconductor. Their device passed a stringent protocol, suggesting a high probability of hosting Majorana zero modes.

Topic 16. CHANDRAYAAN-3 MISSION: WHY ISRO WANTS TO EXPLORE THE MOON'S SOUTH POLE

Important for the subject: Science and technology

IS THE MOON'S POLAR REGION VISIBLE FROM EARTH?

Most of the Moon's polar regions remain hidden from Earth's view. Our understanding of the lunar south pole is derived from the data collected by spacecraft.

WHY HASN'T ANY MOON MISSION LANDED ON THE SOUTH POLE YET?

The lunar south pole poses formidable challenges for exploration. Its rugged and treacherous terrain, coupled with perpetual darkness in some areas, has deterred missions thus far. Temperatures plummet to astonishing lows of -230 degrees Celsius, creating a harsh environment.

Chandrayaan-3 is India's upcoming lunar mission, which aims to be the world's first mission to soft-land near the lunar south pole.

Chandrayaan-3 is India's third moon mission and is a follow-up of Chandrayaan-2 (2019) which aimed to land a rover on the lunar South Pole. The Mission will have three major modules- the Propulsion module (will carry the lander and rover configuration till 100 km lunar orbit) Lander module (capability to soft land and deploy Rover) Rover (will carry out in-situ chemical analysis of the lunar surface)

Challenges of landing on the South Pole:

- **Previous spacecraft have mostly landed near the equatorial region of the Moon**, a few degrees latitude north or south of the lunar equator. **Landing near the equator is easier and safer** due to the **hospitable terrain, smooth surface, absence of steep slopes, and ample sunlight** for solar powered instruments.
- The **lunar south pole, on the other hand, presents a challenging terrain with extreme temperatures** and areas that are in **permanent shadow, receiving no sunlight**.

Why ISRO wants to explore the Moon's south pole?

- **Water Resources:** The south pole region is believed to have water molecules in substantial amounts, possibly trapped as ice in the permanently shadowed craters. Exploring and confirming the presence of water is essential for future human missions and the potential utilization of lunar resources.
- **Scientific Discoveries:** The extreme environment and the presence of permanently shadowed regions provide a preserved record of the Moon's history and the early Solar System.
- **Clues to Earth's History:** The Moon is thought to have formed from debris generated by a giant impact between a Mars-sized object and the early Earth. By studying the lunar south pole, scientists can gain insights into the materials and conditions that existed during the formation of the Earth-Moon system.
- **Global Collaborations:** ISRO-NASA successfully confirmed the presence of water from the data taken by Chandrayaan-1. Indo-Japan collaboration, LUPEX aims to send a lander and rover to the Moon's south pole around 2024.
- **Technological Advancements:** By undertaking missions to this region, ISRO can develop and demonstrate innovative technologies for soft landing, navigation, resource utilization, and long-duration operations that can be applied in future space missions.

About LVM3:

- **Launch Vehicle Mark 3 (LVM3)** (previously known as GSLV-MK III) is a three-stage launch vehicle consisting of two solid propellants S200 strap-ons on its sides and a core stage comprising L110 liquid stage and C25 cryogenic stage.
- The vehicle is also dubbed as one of the heaviest for its ability to carry satellites up to 8,000 kg.

Topic 17. DIFFERENT KIND OF MOON MISSIONS

Important for the subject: Science and technology

The Chandrayaan-3 mission is one of the several space missions lined up to go to the moon, including Russia's Luna 25 mission and NASA's Artemis II.

Different kinds of moon missions:

Flybys:

- These are the missions in which the spacecraft passed near the Moon but did not get into an orbit around it.
- These were either designed to study the Moon from a distance or were on their way to some other planetary body or deep space exploration and happened to pass by the celestial body.
- Examples of flyby missions were Pioneer 3 and 4 by the United States and Luna 3 of the then USSR.

Orbiters:

- These were spacecraft that were designed to get into a lunar orbit and carry out prolonged studies of the Moon's surface and atmosphere. India's Chandrayaan-1 was an Orbiter. Orbiter missions are the most common way to study a planetary body.
- So far, landings have been possible only on the Moon, Mars and Venus. All other planetary bodies have been studied through orbiter or flyby missions.

Impact Mission:

- These are an extension of Orbiter missions. While the main spacecraft keeps going around the Moon, one or more instruments on board make an uncontrolled landing on the lunar surface.
- They get destroyed after the impact, but still send some useful information about the Moon while on their way. One of the instruments on Chandrayaan-1, called Moon Impact Probe, or MIP, was also made to crash land on the Moon's surface in a similar way.

Landers:

- These missions involve the soft landing of the spacecraft on the Moon. The first landing on the moon was accomplished on January 31, 1966, by the Luna 9 spacecraft of the then USSR.

Rovers:

- These are an extension of the lander missions. Rovers are special wheeled payloads on the lander that can detach themselves from the spacecraft and move around on the moon’s surface, collecting very useful information that instruments within the lander would not be able to obtain.
- The rover onboard Vikram lander in the Chandrayaan-2 mission was called **Pragyaan**.

Human missions:

- These involve the landing of astronauts on the moon’s surface. So far only NASA of the United States has been able to land human beings on the moon. So far, six teams of two astronauts each have landed on the moon, all between 1969 and 1972.
- After that, no attempt has been made to land on the Moon. But with NASA’s Artemis III, currently planned for 2025, humanity is set to once again to the lunar surface in more than 50 years.

Topic 18. ARTIFICIAL SWEETENER: WHO PANEL SAYS NO NEED TO CUT DAILY INTAKE

Important for the subject: Science and technology

Name of LCS	Source
1. Sucralose	<ul style="list-style-type: none"> • Made from adding chlorine to sugar molecules.
2. Saccharin	<ul style="list-style-type: none"> • The oldest artificial sweetener. • Made from benzoic sulfonimine and is up to 700 times sweeter than table sugar.
3. Acesulfame	<ul style="list-style-type: none"> • Made from acesulfame potassium.
4. Aspartame	<ul style="list-style-type: none"> • Made from the amino acids phenylalanine and aspartic acid. Also includes methanol.
5. Neotame	<ul style="list-style-type: none"> • Similar to aspartame and made from phenylalanine and aspartic acid.
6. Stevia	<ul style="list-style-type: none"> • Extracted from the leaves of the stevia plant. • The extracts are processed before they're packaged and sold, putting them in the same category as an artificial sweetener.
7. Sugar alcohols	<ul style="list-style-type: none"> • Sugar molecules with an alcohol attached. Naturally occur in some fruits.

A World Health Organization's (WHO) committee categorized **artificial sweetener aspartame** as “possibly carcinogenic to humans”.

WHO findings:

- The analysis by **WHO's International Agency for Research on Cancer** found the product to be “**possibly carcinogenic to humans**” — a categorization generally used for things when there is either limited, but not convincing, evidence for cancer in humans or convincing evidence for cancer in experimental animals, but not both.
- It is the **third-highest level** out of the **four levels** in which the **IARC** categorizes carcinogens.
- The committee also said there was “**limited evidence**” from mechanistic studies that show that **aspartame characteristics are similar to cancer causing agents** such as **inducing oxidative stress, chronic inflammation and alterations to cell death mechanisms**.
- The **second assessment** by **WHO** and **Food and Agriculture Organization's (FAO) Joint Expert Committee on Food Additives (JECFA)** said “there was **no convincing evidence** from experimental animal or human data that aspartame has adverse effects after ingestion”.
- The committee said there was no reason to change the established **acceptable daily intake (ADI) of 0–40 mg/kg body weight**.

Aspartame (Artificial sweetener):

- Aspartame is widely used as a sugar substitute in various food and beverage products, including diet soft drinks, chewing gum, ice creams and breakfast cereals. These sweeteners are **chemically synthesized** and provide a **sweet taste without the high-calorie content** of regular sugar.
- The **current acceptable daily intake (ADI) of 0-40 mg/kg** body weight is pretty high. **Other examples of artificial sweeteners are:** Sucralose, Saccharin, Stevia, Neo tame and Erythritol.

What is Erythritol?

- Erythritol is a popular artificial sweetener that is widely available throughout the world.
- It is an **organic compound** – a naturally occurring, four-carbon sugar alcohol (or polyol).

It is used as a food additive and sugar substitute. Erythritol is **60–70% as sweet as sucrose** (table sugar). However, it is almost completely non caloric and does not affect blood sugar or cause tooth decay.

- **Synthesis:** It is synthesized from corn using enzymes and fermentation.

Topic 19. SUN TO REACH SOLAR MAXIMUM IN 2 YEARS, MAY LEAD TO “INTERNET APOCALYPSE”

Important for the subject: Science and technology

The Sun will reach “**solar maximum**” – a particularly active period – in **2025** and today’s digital world is not prepared for it.

About Solar Maximum:

- The sun goes through a **natural solar cycle** approximately every **11 years**. The cycle is marked by the **increase** and **decrease** of **sunspots**– visible as dark blemishes on the sun’s surface, or photosphere. The greatest number of sunspots in any given solar cycle is designated as “**solar maximum.**” The lowest number is “**solar minimum.**”

Impacts:

- This increased solar activity can cause **extreme space weather events**, including **solar flares** and eruptions. It can also **disrupt radio communications** and the **power grid** and have serious **health consequences for astronauts**.
- A **strong solar storm could hit Earth** – a rare event that has not happened in the interconnected world so far – causing **widespread internet outages**.

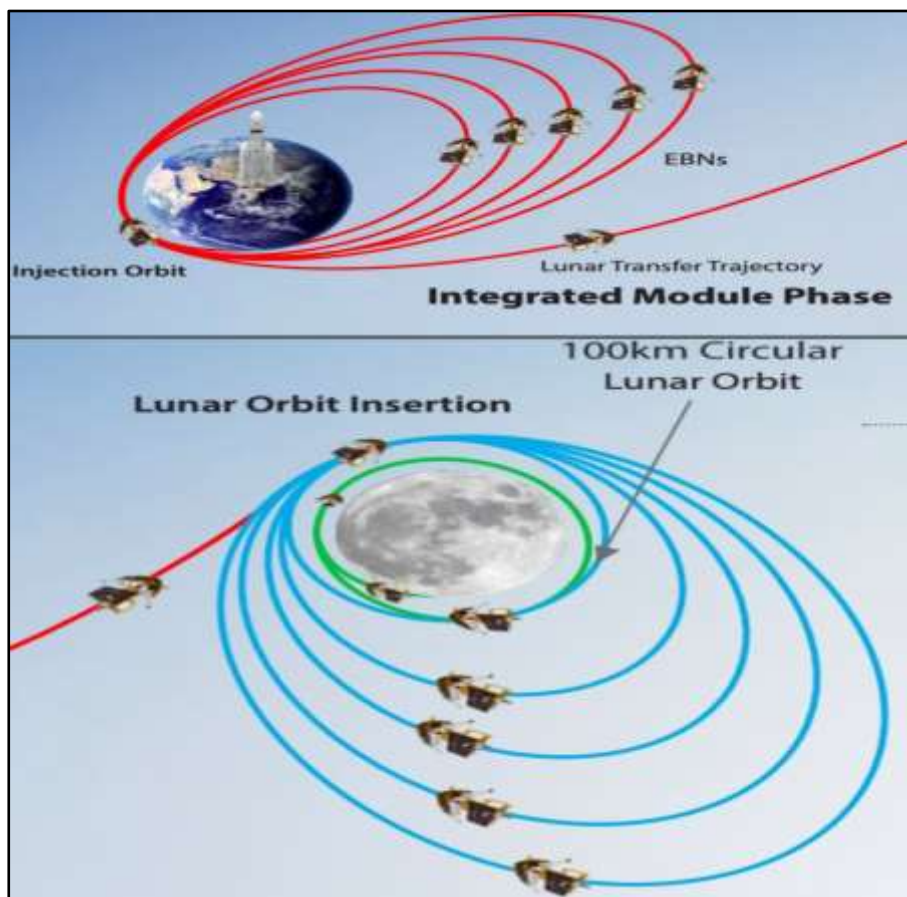
What is the Solar Cycle?

- The Sun is a huge ball of electrically charged hot gas. This charged gas moves, generating a powerful magnetic field.
- **Every 11 years** or so, the **Sun’s magnetic field completely flips**. This means that the **Sun’s north and south poles switch places**. Then it takes about another **11 years** for the Sun’s north and south poles to flip back again.
- Thus, the solar cycle is the cycle that the Sun’s magnetic field goes through approximately every 11 years.

- The solar cycle affects activity on the surface of the Sun, such as **sunspots** which are caused by the **Sun's magnetic fields**. As the magnetic fields change, so does the amount of activity on the Sun's surface.
- The **beginning of a solar cycle is a solar minimum**, or when the Sun has the least sunspots. Over time, solar activity—and the number of sunspots—increases.
- The **middle of the solar cycle is the solar maximum**, or when the Sun has the most sunspots. As the **cycle ends**, it fades back to the **solar minimum** and then a **new cycle begins**.

Topic 20. CHANDRAYAAN3'S SLINGSHOT ROUTE TO THE MOON

Important for the subject: Science and technology



Besides, Chandrayaan3, like its predecessor Chandrayaan2, will take a rather intriguing route to the moon. It will circle the earth five six times, to get the slingshot effect. It will likewise circle the moon 56 times before the lander began its descent on to the moon's surface.

Sling shot Effect

- The slingshot effect is also known as a **planetary swing-by or a gravity-assist manoeuvre**.
- It is **performed to achieve an increase in speed and/or a change of direction** of a spacecraft as it passes close to a planet. As it approaches, the spacecraft is caught by the gravitational field of the planet, and swings around it.
- The speed acquired is then sufficient to throw the spacecraft back out again, away from the planet.
- By controlling the approach, the outcome of the manoeuvre can be manipulated and the spacecraft can acquire some of the planet's velocity, relative to the Sun

Why Sling Shot effect in Chandrayaan3?

- To use the earth's gravity to impart enough velocity to the spacecraft to shoot off to the Moon. In other words, the earth's gravity does some of the function of the rocket fuel. Kepler's Second Law of planetary motion says the line connecting a satellite and the parent body sweeps equal areas in equal intervals of time. This means that as the satellite gets closer to the parent body, it acquires more velocity. And the farther the object comes from, the higher the velocity it acquires when it turns around the parent body.
- After the LVM3 puts Chandrayaan3 above the earth, the spacecraft will start circling the earth on its own, in an elliptical orbit.
- 19/25 When it reaches the farthest point, ground engineers will nudge it slightly to change the direction a little so that its next loop is bigger than the first.
- So, when the spacecraft approaches the earth on its second loop, it will acquire a higher velocity.
- Again, when it reaches the farthest point, called apogee, the engineers will once again change the direction a little, so that on the third loop, the spacecraft acquires an even higher velocity.
- So on for 56 laps, at which point the spacecraft would have acquired enough velocity to sling itself towards the moon. When it is about 100 km from the moon's surface, the lander will detach itself and begin its descent. On reaching the moon, the reverse will happen.

Topic 21. CHINA'S GALLIUM AND GERMANIUM CONTROLS: WHAT THEY MEAN AND WHAT COULD HAPPEN NEXT

Important for the subject: Geography

From August, **China** is to **restrict exports** of **gallium** and **germanium**, two critical elements for making semiconductor chips.

Germanium:

- **Germanium** is particularly useful in **space technologies** such as **solar cells** because **it is more resistant to cosmic radiation than silicon**. It is already used in small quantities in some **semiconductors to improve things like electron flow and thermal conductivity**.

Production and export of Germanium:

- **China** controls about **60%** of **all germanium supplies**.
- The element is derived in **two main ways**:
- As a **by-product of zinc production** and **From coal**

Germanium from zinc production:

- **China** dominates **germanium** that comes from **zinc production**. The **US** is one of the alternative suppliers, with **deposits in Alaska and Tennessee** and additional refining capacity in **But the US is still over 50% reliant on imported Germanium**.

Germanium from coal:

- Two of the main producers are **Russia** and **Ukraine** (Russia-Ukraine has impacted the supply chain to the West). **Environmental concerns** and pledges to **phase out of coal power** have threatened the production of germanium via this method.

Gallium:

- As for **gallium**, **95%** of it is used in a material called **gallium arsenide**, which is used in **semiconductors with higher performance and lower power consumption applications than silicon**.
- These are used in **blue and violet LEDs** and **microwave devices**. **Gallium nitride** is

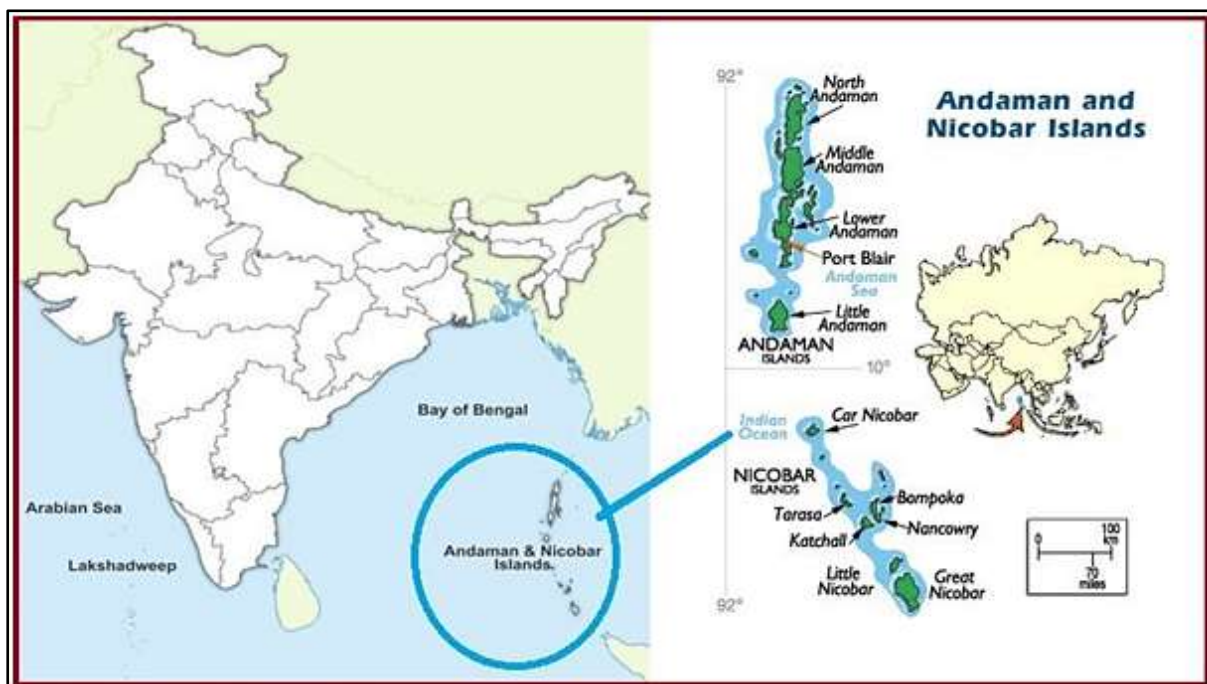
used in **semiconductors** in components for things like **electric vehicles**, **sensors**, **high-end radio communications**, **LEDs** and **Blu-Ray players**.

Production and export of Gallium:

- **China** accounts for **around 80%** of the world's supply of **Gallium**. It is mainly derived from **aluminium production**. **Gallium** is also obtained by **recycling semiconductor wafers**, which are thin slices of semiconductor used in electronic circuits. A Nature Communications paper in 2022 noted that **gallium** is “**almost never functionally recycled**” once it reaches final products.

Topic 22. OVER 10 EOIS RECEIVED, IN TALKS WITH MORE INTERESTED BIDDERS FOR GREAT NICOBAR PORT

Important for the subject: Geography



“At least” 10 EoIs (Expression of Interest) have been received for the proposed **₹48,000 crore trans-shipment port project** at **Galathea Bay** in **Great Nicobar Island** off the **Bay of Bengal**.

- Reportedly the government would look at a **PPP mode** via the **landlord model**, or a **hybrid annuity model** could also be considered because of the high nature of

investments.

About the Project:

- The **Great Nicobar port** is to be developed in **four phases** with a **total capacity of 16 million tonnes** of container cargo handling, per year.
- The **proposed container shipment hub** is supposed to be **located strategically** between **Singapore** and **Colombo** – **two major trans-shipment ports** on the **international sea trade/shipping route**.
- The **Great Nicobar Port** will act as a **feeder port** to these two; apart from itself being a **trans-shipment port** to shipments from **Bangladesh** and **Myanmar**. The **majority of India's transshipped cargo** is handled in ports outside of the country with **Colombo port** handling the majority of international transshipped cargo.

Trans-shipment port:

- When goods have to be offloaded at an intermediate port and loaded onto a different ship to make its onward journey to its final destination, it is called **transshipment**. The port or port where it is offloaded to take the connecting vessel is called the **trans-shipment port**.
- The **Vizhinjam Port** located in **Vizhinjam, Kerala**, is **developing this deep-sea water port** as **India's first Mega Transshipment Container Terminal**.

Feeder port:

- A feeder vessel is a vessel that “feeds” large ocean vessels with containers. A **feeder port** is a **port** where **large ocean vessels normally don't go**. Partly because there are not enough containers to load onto a large ocean vessel or because the port is not large enough to handle the large ocean vessels.
- The central government is planning to develop **Puducherry port** as a **feeder port for Chennai Port**.

What is the Landlord Model of Port?

- In this model, the **publicly governed port authority** acts as a **regulatory body** and as a **landlord**, while **private companies** carry out **port operations**—mainly **cargo-handling activities**.
- Here, the **port authority** maintains ownership of the port while the infrastructure is

leased to private firms that provide and maintain their own superstructure and install their own equipment to handle cargo. In return, the landlord port gets a share of the revenue from the private entity.

The Hybrid Annuity Model (HAM):

- In **India**, the new **HAM** is a **mix of Build-Operate-Transfer (BOT) Annuity and Engineering, Procurement and Construction (EPC) models**.
- As per the design, the **government will contribute 40% of the project cost** in the first five years through annual payments (annuity). The **remaining payment will be made on the basis of the assets created** and the performance of the developer.
- Here, **hybrid annuity** means the **first 40% payment is made as fixed amount in five equal instalments** whereas the **remaining 60% is paid as variable annuity amount** after the completion of the project depending upon the value of assets created.
- As the government pays only 40%, during the construction stage, the developer should find money for the remaining amount. Here, he has to raise the remaining 60% in the form of equity or loans.
- The private developer will recover his investment from the government by receiving annuity payments over a period of 15 years. The government also offers 80 per cent of prior land acquisition and forest clearance in such projects to the developers.
- There is no toll right for the developer. Under HAM, Revenue collection would be the responsibility of the National Highways Authority of India (NHAI).

Topic 23. BIHAR'S MAKHANA AND THE WETLANDS THEY GROW IN

Important for the subject: Geography

Makhana:

Makhana is the **seed of a water lily species, Euryale ferox**, found in **south and east Asia**. Mithila Makhana or Makhan is a special variety of **aquatic fox nut** cultivated in the **Mithila region of Bihar and Nepal**.

When harvested, it is actually a **tough blackish seed**. It undergoes long and laborious stages of **drying, heating, grading and roasting** before it is popped to take on the white form as we know it. Mithila Makhana is a **GI-tagged product**.

Micro-nutrients:

- Fox Nuts are rich in protein and fibre and have various micronutrients such as magnesium, calcium, phosphorus and iron.

Production of Makahana:

- For the region of **Darbhanga in Bihar**, both **makhana** and the **wetlands** they grow in, are very significant. **Over 85% of India's makhana comes from Bihar** and almost a quarter of it is produced in **Darbhanga's wetlands**.
- **Almost 850 ponds** in the district are currently used for **makhana cultivation** as per government documents. These wetlands, therefore, are important for the state's makhana cultivation and the livelihoods they support.

Significance:

- The Maithili Brahmin community extensively uses and distributes Makhana during the **Kojagara Puja festival**.

Threats to the production of Makhana:

- The water bodies are losing to pollution, illegal construction and encroachments. A **2001 study** found traces of toxic metals like **lead, chromium, copper** and **cadmium** in ponds and in the makhana that grew in them.

Topic 24. RESEARCHERS STUDY THE ELUSIVE DUGONGS OF THE ANDAMANS WITH HELP FROM COMMUNITY STAKEHOLDERS***Important for the subject: Geography***

A recent study used reports from **fishers, divers, Indian defence agencies** and **forest departments**, over a **five-year period**, to monitor **dugongs** in the **Andaman Islands**.

Details:

- **Dugong** monitoring is challenging in areas such as the **Andaman Islands**. Citizen scientist and stakeholder networks are an **effective and low-cost method** for spotting dugong populations in such areas. Due to the **vastness of the islands**, it is challenging to engage a population and one needs a strong rapport and network with communities.

- The recent findings seem to indicate that **dugong populations in the Andaman Islands are recovering**. **Tamil Nadu** has declared **India's first dugong conservation reserve** in the **Gulf of Mannar** and the adjacent **Palk Bay** on the southeast coast of India.

About Dugongs:

- **Dugongs** (also known as **Sea cows**) are **one of the only four surviving species** of the order **Sirenia**— a once diverse group of **marine mammals** that include **manatees**.
- Found in the **coastal waters of at least 39 countries** in the **Indo-Pacific region**. Dugongs are **herbivores** and eat seagrasses. They give birth to a single calf. Their heavy bones and haemoglobin-rich blood enables them to stay underwater for long periods.
- The dugongs have to come up to the surface of the sea for breathing once in every 5-7 minutes. This is when they are the most vulnerable to attacks.
- **'World Dugong Day'** is celebrated on **May 28**.

Vulnerability:

- Dugongs are categorized as **vulnerable** according to the **International Union for the Conservation of Nature (IUCN) Red List**. Compared to other regions where the dugong is found, its population is low, with an estimated **250 in Indian waters**.

Habitat:

- Dugongs live in **sea-grass meadows** found in **warm shallow coastal waters**, which are their sole food source. **In India**, they are sighted at the **Gulf of Mannar in Tamil Nadu**, the **Andaman and Nicobar Islands** and the **Gulf of Kutch in Gujarat**.

Threats:

- **Dugong populations have declined globally in recent decades** due to **habitat loss, by catch, hunting and boat collisions** and were believed to be **locally extinct in Little Andamans Island**.
- **Sea-grass meadows are highly sensitive to severe weather events** and human activities. **Dredging, trawling, and runoff** can significantly disrupt these ecosystems.
- The **tsunami in 2004** disrupted sea-grass meadows around **Little Andaman**, part of the **Andaman Islands**, so significantly, that dugongs were thought to be locally extinct.

Topic 25. HOW A TINY FISH THAT FUELS AN ATLANTIC ECOSYSTEM IS AT THE CENTRE OF INDUSTRY DEBATES

Important for the subject: Geography



Researchers hoped to find evidence of a healthy new generation of **ospreys** when they checked **84 nests of the fish-eating bird** in mid-June at **Mobjack Bay, an inlet at the southern end of the Chesapeake Bay**. They found **only three young**.

- It was the **lowest reproductive number in more than 50 years**. The decline is mainly due to the bay-wide depletion of ‘**Atlantic menhaden (little silvery fish)**’, the favourite food of those birds.

Atlantic menhaden:

- The **fish are nutrient-rich**, a good source of **omega-3 fatty acids**; they consume smaller organisms like **plankton**, and they **filter huge quantities of ocean water**.
- Hundreds of millions of the little silvery fish **play a crucial role in the ecology of coastal waters**, which includes **feeding bigger fish** like **striped bass** and **weakfish**; **marine mammals** including **whales and dolphins**; and **birds** like **bald eagles, great blue herons** and **brown pelicans**.
- They are also useful for commercial fishing industries and in **reduction fisheries**, in

which they are ground up and turned into products including fish oil and fish meal.

What is the concern?

- This year, the **Atlantic States Marine Fisheries Commission**, a federal regulator, **increased the amount of menhaden allowed to be caught to 233,550 metric tons** throughout the
- Atlantic coast for the next two years, about **20% higher than the previous two years**. Removal of such large quantities of fish from the bay is **degrading the ecosystem**.
- The disappearance of most of the menhaden from the bay is contributing to the disappearance of the many species (for example: **Osprey** and **Striped bass**) that rely on menhaden.

Positive signs for menhaden elsewhere:

- Outside the **Chesapeake Bay**, the number of **menhaden** has increased. Evidence of their recent abundance can be found **off the coasts of New York and New Jersey**, where more of their predators, include **humpback whales, tuna, sharks and bald eagles**.

Topic 26. CHANDRAYAAN-3 MISSION: HOW SRIHARIKOTA BECAME ISRO'S IDEAL LAUNCHPAD

Important for the subject: Geography

India's **third lunar mission** and **second attempt to soft-land on the Moon**, the **Chandrayaan-3**, took off on Friday at 2:35 pm from the **Satish Dhawan Space Center (SDSC) in Sriharikota**.

- **There are three major rocket launch sites in India:**
 1. Vikram Sarabhai Space Centre, Thiruvananthapuram (Thumba), Kerala,
 2. Satish Dhawan Space Centre (Sriharikota), Andhra Pradesh,
 3. Dr. Abdul Kalam Island, Bhadrak, Odisha

Satish Dhawan Space Centre (SDSC), Sriharikota:

- Sriharikota is a **spindle-shaped island** on the **east coast of Andhra Pradesh**. The SDSC is the **country's only spaceport from where spacecraft and satellites are launched**.
- It became operational on **October 9, 1971**, with the flight of '**Rohini-125**', a

small sounding rocket, and was initially known as **SHAR (Sriharikota Range)**.

- But in **September 2002**, the space centre was renamed **Satish Dhawan Space Centre SHAR** to honour mathematician and former **ISRO's Chairman Satish Dhawan**.

How was Sriharikota selected as the launch site?

- The search for a launch site began in **1960s** when **Vikram Sarabhai** and **EV Chitnis** started looking for a launch site on the east coast of the country.
- In **March 1968**, **Chitnis** contacted then **Director of Industry of Andhra Pradesh, Abid Hussain**, who helped him acquire information and prepare maps for potential sites, including **Sriharikota**.

Why was Sriharikota chosen?

- There were **two primary reasons** for selecting **Sriharikota** as the launch site. One, it is on the **east coast** which **facilitates the launching of the rockets** in an easterly direction. Two, **its proximity to the equator**.
- By launching a rocket eastwards, one can take advantage of **Earth's rotation**. For a launch site **close to the equator** the magnitude of the velocity imparted due to Earth's rotation is about **450 m/s**, which can lead to a **substantial increase in the payload for a given launch vehicle**.
- **Geostationary satellites** must necessarily be in the **equatorial plane**. So, for such satellites, the closer the launch site is to the equator the better it is. There were other considerations also, such as **it was a largely uninhabited area and closer to the sea**.
- This helped ensure that the **flight path of launch vehicles or rockets** is entirely over the sea, so that impact of separated rocket hardware can take place on the high seas without any constraints.

Vikram Sarabhai Space Centre or Thumba:

- **Thumba Equatorial Rocket Launching Station (TERLS)** is an **Indian spaceport** established on **21 November 1963**.
- Operated by the **Indian Space Research Organisation (ISRO)**, it is located in **Thumba, Thiruvananthapuram, Kerala**, which is near the **southern tip of mainland India**, very close to **Earth's magnetic equator**. It is currently used by ISRO for launching sounding

rockets.

Abdul Kalam Island:

- Formerly known as **Wheeler Island**, **Dr Abdul Kalam Island** is an island located in the **coastal outskirts of Odisha, India**, which hosts the **Integrated Test Range missile testing facility**.
- It is operated by the **Defence Research and Development Organization (DRDO)** and is host to most of the military missile testing in India. Its main purpose is to make an advancement in the development of launch vehicle technology in India.

Search for a new launch pad:

- ISRO is considering a second launch pad in **Kulasekarapattinam**, a town in the **Thoothukudi (Tuticorin) district of Tamil Nadu**

Why?

- Proximity to the seashore makes **Thoothukudi ideal** for “**straight southward**” launches. From **Sriharikota**, such southward-bound launches are not possible as the rockets have to fly around Sri Lanka.
- **Nearness to the equator:** Like the Sriharikota spaceport in the Satish Dhawan Space Centre, **Thoothukudi** was selected as a spaceport due to its nearness to the equator. A rocket launch site should be on the east coast and near the equator.
- **Logistical ease:** ISRO has its Liquid Propulsion Systems Centre (LPSC) at Mahendragiri in Tirunelveli district, where it assembles the **second and fourth-stage engines** for the PSLV. Instead of transporting the second and fourth stages to Sriharikota from Mahendragiri, it would be easier to shift them to the launch pad if it is built in Kulasekarapattinam, which is around 100 km away.

Who was Satish Dhawan?

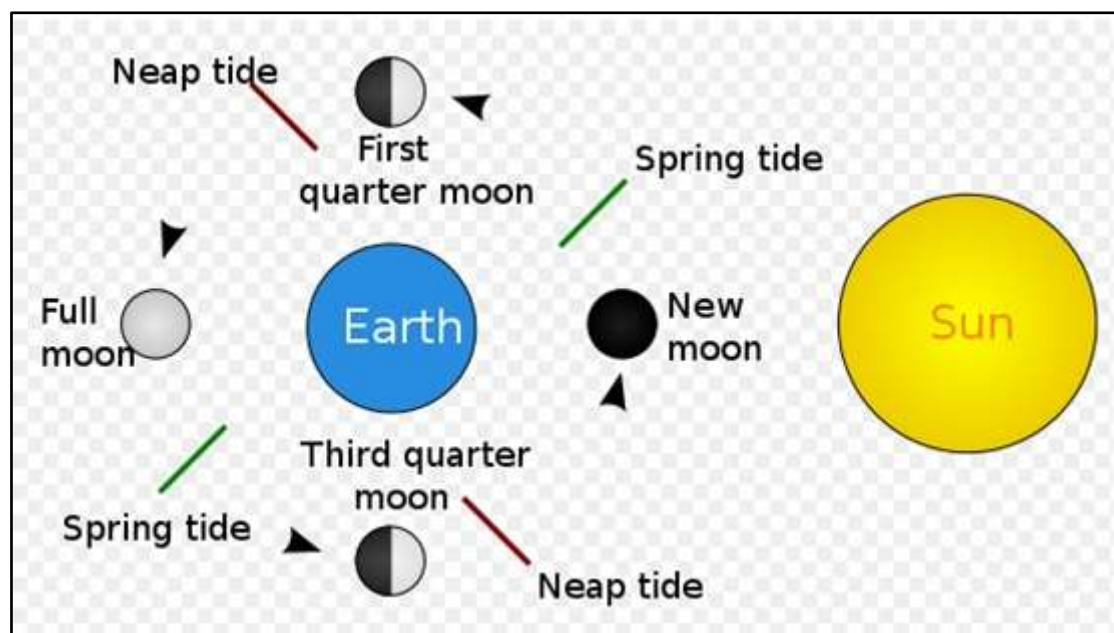
- Born in **Srinagar**, **Dhawan** was an **Indian rocket scientist**, known as the ‘**Father of Experimental Fluid Dynamics research**’ in India.
- He is also one of the foremost researchers in the field of **turbulence and boundary layers**. In **1972**, **Dhawan succeeded Vikram Sarabhai** as the **Chairman of ISRO**. In the decade following his appointment, he directed the **Indian space programme** through

a period of extraordinary growth and spectacular achievement.

- His efforts led to operational systems like **INSAT- a telecommunications satellite**, **IRS – the Indian Remote Sensing satellite** and the **Polar Satellite Launch Vehicle (PSLV)** that placed India in the league of space-faring nations. It was after his death in **2002** that the **space centre in Sriharikota** was renamed the **Satish Dhawan Space Center** to honour his legacy.

Topic 27. HOW HAS THE MOON TRANSFORMED OUR EVOLUTION?

Important for the subject: geography



Chandrayan-3, India's moon mission which was launched on 14 July 2023, has set high hopes for India expecting its first moon soft landing.

Moon's impact on Earth:

- Moon, the satellite of the Earth with an **orbit of 384,400 kilo meters**, has a profound impact on lives on Earth. Though the **Moon's gravitational pull is weaker than Earth's**, it is responsible for **Earth's current length of the day, stable seasons and tides**.
- The **big tidal ranges** have been responsible for **forcing bony fish into shallow pools on land**, prompting the **evolution of weight-bearing limbs and air breathing organs**.

Tides:

- The biggest impact that the moon has on life is through tides. The tides resulting from the **gravitational force of the moon** affect animal life in the **intertidal zone**, where the ocean meets the land between high and low tides.
- **Weaker tides** due to the absence of the moon would have narrowed down this zone, increasing the competition for survival among the species. Billions of years ago, when the **moon was closer to the Earth**, **extreme tides** used to occur frequently because the Earth was spinning more rapidly. The **tides eroded the coastal areas**, adding minerals to the oceans which have been essential for life to evolve quickly.
- **Tides** led by the moon also affect the **reproductive cycles of marine life**, where the **laying and hatching of turtles' eggs depend on the timing of tides**.

Lunar cycles affecting reproduction in animals:

- The **reproductive cycles of many marine creatures** are closely synchronized with **lunar phases'**, including **migration and spawning in fish, crabs and triggering in plankton** by the moon's glow.
- **Circalunar rhythms**, which are tied to lunar cycles affect different types of organisms. The Moon is essential to migration and navigation, particularly for birds.
- The **sleep cycles** of the 'pre-industrial communities' were strongly influenced by lunar activity. **Climate change and stabilizing seasons**
- The absence of the moon would lead to extreme climate change. There would be **huge differences between temperatures and daylight throughout the year**, and **ice ages would hit different parts of the world** every few thousand years.
- The **moon's gravitational pull** helps **transport heat away from the equator and towards the poles**, fundamentally shaping **Earth's climate**. Moon also **stabilizes the Earth's rotation** on its axis by **slowing Earth's rotation on its axis**.
- In the **absence of the moon**, the poles would be burning hot and the equator freezing cold, seasons would be a thing of the past, and night and day would be equally long all year round.

Light of moon:

- Just like the planets, the **moon does not emit its own light but shines due to the reflection of the Sun's light**.

- Fluctuating light levels by the moon have a startling impact on life on Earth. The ability to see and to be seen enhances in the moonlight.
- Studies have documented changes in the **success rates of predators** and **foraging patterns of prey animals** due to this added nighttime illumination. Studies have shown that **lions are less likely to hunt during the full moon and lion attacks on humans happen 10 days after the full moon.** Many bats will be less active during the full moon.
- **Coral** and **certain species of crabs, worms and fish** can sense the moonlight from particular phases of the Moon. They use this as a trigger to start species-wide reproduction.
- **Nocturnal animals** behave differently depending on where the moon is in the sky during its **29.5-day cycle.** When the moon is full and bright, **prey fish stay hidden in the reef,** when they'd be most visible.

Tectonic plates, water distribution:

- Planetologists at the University of Münster (Germany) have shown, for the first time, that **water came to Earth with the formation of the Moon some 4.4 billion years ago.**
- The moon was formed when Earth was hit by a body called **Theia.** Researchers from Munster proved that, **Theia came from the outer solar system and delivered large quantities of water to Earth.**
- According to scientists, the **collision that led to the formation of the moon provided sufficient carbonaceous material to account for the entire amount of water on Earth.**
- The **moon's pull of gravity** might have set our tectonic plates. It raises the level of the world's oceans towards the equator. Without this gravity, the oceans would redistribute, raising levels at the poles.

About Tides:

- Tides can be defined as the alternate rise and fall of ocean water. It is caused by the combined effects of : The gravitational force exerted on Earth by the Sun The gravitational force exerted on Earth by the Moon Rotation of the Earth

Neap Tide:

- When the Sun and Moon form a right angle, as when a half moon can be seen, their gravitational pulls fight each other and one can notice a smaller difference between high

and low tides. These are called neap tides.

Spring Tide:

- When the Moon, Earth, and Sun fall in a straight line, which is called as syzygy (sizeh-gee), the greatest difference between high and low tide water levels can be observed.
- These spring tides occur twice each month, during the full and new Moon. If the Moon is at perigee, the closest it approaches Earth in its orbit, the tides are especially high and low.

Topic 28. CHANDRA TAAL

Important for the subject: Geography

About:

Tso Chigma or **Chandra Taal** (meaning the Lake of the Moon), or **Chandra Tal** is a lake in the **Spiti** part of the **Lahul and Spiti district** of **Himachal Pradesh, India**. **Chandra Taal** is near the source of the **Chandra River**. The lake is one of two **high-altitude wetlands** of India which have been designated as **Ramsar sites**.

Despite the rugged and inhospitable surroundings, it is in a protected niche with some flowers and wildlife in summer. It is usually associated with **Spiti**, although geographically it is separated from Spiti. **Kunzum La** separates **Lahaul and Spiti valleys**.

Location:

- Chandra Taal Lake is on the **Samudra Tapu plateau**, which overlooks the **Chandra River** (a source river of the **Chenab**).
- The name of the lake originates from its **crescent shape**. It is at an altitude of about **4,300 metres** (14,100 ft) in the Himalayas. **Mountains of scree** overlook the lake on one side, and a **cirque** encloses it on the other.
- A **cirque** is an amphitheatre-like valley formed by **glacial erosion**. Alternative names for this landform are **corrie** and **cwm**. A cirque may also be a similarly shaped landform arising from **fluvial erosion**.
- The term **scree** is applied both to an **unstable steep mountain slope composed of rock fragments and other debris** and to the **mixture of rock fragments and debris itself**.

Flora and Fauna:

- There are vast **meadows** on the banks of the lake. During springtime, these **meadows** are carpeted with hundreds of varieties of wildflowers.
- There was a **plain of good grass to the north of Chandra Taal**, where shepherds brought large herds for grazing from Kullu and Kangra.
- Due to **overgrazing**, the **grasslands are now degraded**. **Chandra Taal** is home to a few species such as the **Snow Leopard, Snow Cock, Chukor, Black Ring Stilt, Kestrel, Golden Eagle, Chough, Red Fox, Himalayan Ibex, and Blue Sheep**. Over time, these species have adapted to the **cold arid climate, intense radiation, and oxygen deficiency** by developing special physiological features. **Migratory species** such as the **Ruddy shelduck** are found in summer.

Topic 29. 41 MT OF COAL TO BE TRANSPORTED THROUGH INLAND WATERWAYS IN FY24

Important for the subject: Geography

The **Ministry of Ports, Shipping, and Waterways (MoPSW)** in India is aiming to increase coal supplies through the inland waterways network.

- They are looking to transport **41.06 million tonnes of coal** in the current fiscal year, a **17% increase** from the previous year. **Coal transportation through waterways** has seen significant growth, with a compounded annual growth rate of **16.71%** since 2019.
- Currently, **only five out of over 400 river networks in India** have been developed into **National Waterways**, but a study conducted by the Ports Ministry has identified **111 river systems** that could be developed into **National Waterways**, with **26** of them being navigable.
- The focus is currently on the development of **National Waterways 5** along the **Brahmani-Mahanadi route**.

Coal production and consumption:

- India is among the **top five coal-producing countries** in the world. Despite being a major producer, **India also imports coal to meet some of its demands**. India is a significant consumer of coal, which is used for power generation and industrial processes.

Key terminologies

Coking coal: a type of coal that is used in the production of steel.

Anthracite: a hard and compact type of coal that has a high carbon content.

- **Pulverised coal injection (PCI coal):** a method of injecting pulverized coal into a blast furnace to improve the efficiency of the iron-making process.
- **Met coke:** a type of coke made by heating coal in the absence of air, which is used as a fuel in blast furnaces to produce iron.
- **Pet coke:** a carbon-rich solid material that is derived from oil refining. It is used as a fuel in industrial processes.

Water transport:

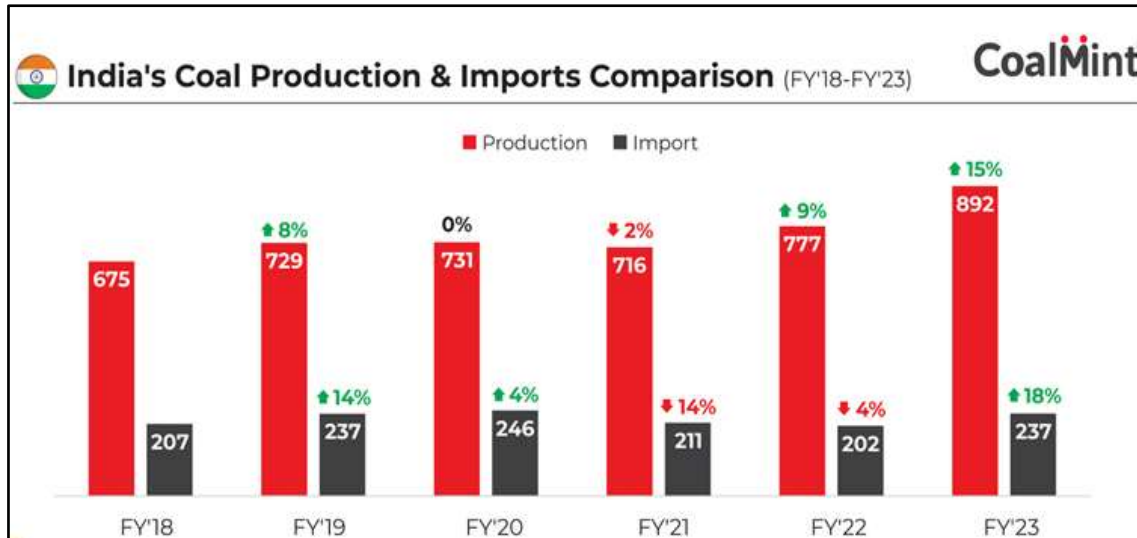
- Waterways are the **cheapest means of transport** and are **most suitable for carrying heavy and bulky materials having low specific costs**. Water transport is a **fuel-efficient** and **environmentally friendly** mode of transportation which has vast employment generation potential.
- The main drawback is that it takes longer time than roads and railways to deliver a product. Currently, **coastal and inland waterways** contribute **6%** of the country's freight modal mix, while adjacent developing economies, such as **Bangladesh (16%)** and **Thailand (12%)** have a higher share of water-based transport, highlighting the scope for improvement for India.

Inland Water Transport in India:

- India has over **5,000 km** of navigable inland waterways under development. It has **lower operating costs** (30% lower than the railways and 60% lower than road) and a **sustainable mode of freight logistics and passenger transport**
- To harness the potential of IWT, the **Inland Waterways Authority of India (IWAI)** was established in **1986**. The Government has identified a few important Waterways, which are given the status of **National Waterways**
- From **only five waterways** recognized as **National Waterways (NWs)**, the government of India notified **106 additional waterways as National Waterways**, by the **National Waterways Act, of 2016**.

Topic 30. INDIAN MET COKE MAKERS REDUCE CAPACITY UTILIZATION TO ONE-THIRD AMID RISING IMPORTS

Important for the subject: Geography



Indian met coke or metallurgical coal producers are operating at 30-35 per cent of their capacities (one-third of their installed capacity) in the face of increased imports.

Details:

- **Met Coke** is a key steel-making feedstock, and **India** is the second largest crude steel maker in the world. **Bhutan (1st), India (2nd) and Pakistan (3rd)** are the top 3 importers of met coke in the world.
- **India imports** most of its Metallurgical coke from **China, Poland and Colombia** and is the **2nd largest importer of Metallurgical coke** in the World.

Factors Influencing Increased Imports:

- The **Russia-Ukraine conflict** and sanctions imposed on Russia by Western countries. The **global increase in coal prices**, driven by **higher raw material costs** (coking coal). **Sanctions on Russia**, a major coal exporter, have caused **supply constraints and price hikes**.

About Metallurgical Coke:

- **Metallurgical coke**, also known as **met coke** or **coke breeze**, is a **carbonaceous**

material derived from the destructive distillation of coal in the absence of air. It is a **hard, porous, and carbon-rich material** with **high carbon content** (typically ranging from 85% to 90%).

Production Process:

- **Metallurgical coke** is produced by heating specific grades of coal in the absence of air in a coke oven or coking chamber. The coal is **heated to high temperatures** (around 1000 to 1100 degrees Celsius) in the presence of **controlled amounts of heat and pressure**. The **volatile components of coal**, such as water, tar, and gases, are driven off, leaving behind the **solid carbonaceous residue** known as **metallurgical coke**.

Properties and Characteristics:

- **Metallurgical coke has several important properties that make it suitable for various industrial applications:**
 1. **High Carbon Content:** Met Coke has a **high carbon content**, which provides it with **excellent fuel properties** and makes it an **efficient source of heat** in industrial processes.
 2. **Porosity:** It possesses a **porous structure** that allows for the **efficient flow of gases** and facilitates the combustion process.
 3. **Low Moisture Content:** Met Coke has a **low moisture content**, which contributes to its **high calorific value** and ensures efficient burning.
 4. **High Strength:** It has **good mechanical strength**, enabling it to withstand the physical demands of industrial operations.
 5. **Low Ash Content:** Met Coke has **relatively low ash content**, which reduces impurities and helps maintain product quality.

Applications:

Metallurgical coke finds extensive use in various industries:

- **Steel Production:** It serves as a **primary fuel and reducing agent in blast furnaces** for the production of **iron and steel**. Met coke reacts with iron ore to remove impurities, facilitating the extraction of molten iron.
- **Chemical Industry:** Met Coke is used in the production of chemicals, such as **calcium carbide**, which is essential for **manufacturing acetylene gas, synthetic rubber, and**

other chemical compounds.

- **Foundries:** It is utilized in **foundries** for melting metals and alloys, providing the necessary heat and reducing agents for the casting process.
- **Ferroalloy Production:** Met coke is crucial in the production of ferroalloys, which are alloy metals used in the steelmaking process to introduce specific desirable properties.
- **Pig Iron Production:** It is employed in the manufacturing of pig iron, an intermediate product used in the production of steel and cast iron.

Importance in the Steel Industry:

- **Metallurgical coke plays a vital role in the steel industry due to the following reasons:**
- **Fuel Source:** It provides the primary source of fuel for the intense heat required in blast furnaces during iron and steel production.
- **Chemical Reducing Agent:** Met Coke acts as a reducing agent by reacting with iron ore, facilitating the extraction of iron and removing impurities.
- **Structural Support:** The strength and porosity of met coke allow for the uniform distribution of gases, ensuring efficient combustion and maintaining furnace integrity.

Environmental Concerns:

- The production and use of metallurgical coke **raise environmental concerns due to its association with carbon emissions and air pollution.**
- Efforts are being made to develop alternative processes and technologies that reduce the environmental impact of coke production, such as the use of **biocoke** or **carbon capture and storage (CCS)** techniques.

Topic 31. GOVERNMENT BRINGS GSTN UNDER PMLA

Important for the subject: Economy

Aiming to plug tax evasion through fake billing, Centre has brought the **GST Network (GSTN) under the purview of Prevention of Money Laundering Act (PMLA)**. This will give more power to the Enforcement Directorate (ED), the anti-money laundering agency, to act against tax evasion within GSTN. The government through a gazette notification, notified the exchange of information between ED and GSTN under the Prevention of Money Laundering Act, 2002 (PMLA) to help in such kind of investigations.

- The notification is regarding sharing of information between ED and GSTN under section 66 (1) (iii) of PMLA. The notification will now facilitate sharing of information or material in possession between ED and GSTN, to check any violations of GST provisions.

Goods and Service Tax Network (GSTN)

- It is a **non-profit organization, owned by government**, which manages the entire IT system of the GST portal. **Goods and Services Tax Network (GSTN) has built an Indirect Taxation platform for GST to help taxpayers in India to prepare, file returns, make payments of indirect tax liabilities and do other compliances.**
- It **provides IT infrastructure and services** to the Central and State Governments, taxpayers and other stakeholders for implementation of the Goods and Services Tax (GST) in India.
- The GST System Project is a unique and complex IT initiative as it established for the first time a uniform interface for the taxpayer under indirect taxes through a common and shared IT infrastructure between the Centre and States.

Mission

- Provide common and shared IT infrastructure and services to the Central and State Governments, Tax Payers and other stakeholders for implementation of the Goods & Services Tax (GST).
- Provide common Registration, Return and Payment services to the Tax payers. Partner with other agencies for creating an efficient and user-friendly GST Ecosystem. Encourage and collaborate with GST Suvidha Providers (GSPs) to roll out GST Applications for providing simplified services to the stakeholders.
- Carry out research, study best practises and provide Training and Consultancy to the Tax authorities and other stakeholders.
- Provide efficient Backend Services to the Tax Departments of the Central and State Governments on request. Develop Taxpayer Profiling Utility (TPU) for Central and State Tax Administration. Assist Tax authorities in improving Tax compliance and transparency of the Tax Administration system. Deliver any other services of relevance to the Central and State Governments and other stakeholders on request

Topic 32. BORROWINGS BY BANKS HIT A 8 MONTH HIGH OF ₹ 5.05 LAKH CRORE

Important for the subject: Economy

Outstanding market borrowings of banks touched an eight month high of **₹5.05 lakh crore** as of June 16, the highest since October 21, as per data in the Reserve Bank of India's weekly bulletin.

- Banks borrow using various short term and medium term tools (see box) to meet their immediate liquidity needs arising through various reasons and for effective asset-liability management.
- The present surge is expected to have been driven by short-term fund requirement of banks owing to **quarterly advance tax payments**. It is based on RBI's fortnightly data, which tracks the short-term money market borrowings by banks in the form of **interbank repo operations** and **tri-party repos**.
- Recently RBI updated the master directions Reserve Bank of India (**Call, Notice and Term Money Markets**) Directions, 2021 allowing banks (only Commercial Banks and not SFBs) to **set their own limits for call and notice money borrowings**, in addition to the existing facility available for term money borrowings.
- The move was taken with a view to allow more flexibility and help banks better manage their liquidity requirements, and is expected to support banks' market borrowing going ahead.
- In June, the **tightening liquidity conditions** resulted in **higher money market rates**, causing banks' **borrowing costs to rise**. Still Banks are experiencing high growth of short term borrowing owing to various factors: significant demand for credit, particularly for short-term loans slow deposit growth.
- Quarterly advance tax payments. Outstanding market borrowings of scheduled commercial banks had risen to ₹4.6 lakh crore as of March 2023 from ₹2.7 lakh crore a year ago.
- Borrowings also include securities such as **additional tier-1 bonds** (Bonds, which are counted towards equity, have not fixed maturity period, and can be written off in case of extreme capital shortfall) and **infrastructure bonds**.

Call, Notice and Term Money Markets

- The money market primarily facilitates lending and borrowing of funds between banks and entities like Primary Dealers (PDs). Banks and PDs borrow and lend overnight or for the short period to meet their short term mismatches in fund positions.

This borrowing and lending is on an **unsecured basis**.

- ‘**Call Money**’ is the borrowing or lending of funds for **1 day**. ‘**Notice Money**’ involves lending for a period between 2 days and 14 days ‘**Term Money**’ refers to borrowing/lending of funds for a period exceeding 14 days. **Inter banks repos and tri party repos** are other sources of short term financing.
- Interbank repos involve **collateralized lending** allow banks to lend cash to each other with the purchased securities acting as collateral. Repo, which is short for “**interbank repurchase agreements**,” is a financial transaction between banks involving the sale and repurchase of securities.
- In an interbank repo, one bank acts as the seller, while the other bank acts as the buyer. The selling bank owns securities, **typically government bonds** or other high-quality assets. It agrees to sell these securities to the buying bank and receives cash in return. **Inter-Bank Participation Certificates (IBPCs)** is yet another short-term money market instrument whereby the banks can raise money/deploy short-term surplus.
- In the case of IBPC the borrowing bank passes/sells on the loans and credit that it has in its book, for a temporary period. Investments in IBPC are also used to meet the priority sector lending targets.

Why the 14 day limit for short term?

- If a bank lends to another for a period longer than a reporting fortnight (14 days), then this loan becomes a part of **net demand and time liabilities (NDTL)** for the borrowing banks NDTL is the basis on which Banks have to maintain reserve **statutory liquidity ratio (SLR)** and **cash reserve ratio (CRR)**.
- These reserves dramatically increase the cost of such loans for the borrowing bank. Consequently, almost all short term interbank lending is restricted to a maturity of up to 14 days.

Topic 33. NHB LAUNCHES ₹ 10000 CR URBAN INFRASTRUCTURE DEVELOPMENT FUND

Important for the subject: Economy

In News: National Housing Bank (NHB) on Sunday said it has operationalized the ₹10,000-crore Urban Infrastructure Development Fund (UIDF) announced in this year's Budget for creation of urban infrastructure in tier-2 and tier-3 cities.

- The initial corpus for this fund — managed by **National Housing Bank (NHB)** is **₹10,000 crore**. The **Urban Infrastructure Development Fund (UIDF)** has been launched to supplement efforts of the State governments by providing a **stable and predictable source of finance** for creation of **urban infrastructure in tier-2 and tier-3** cities.
- Union Budget 2023-24 announced the setting up of the UIDF through use of **priority sector lending** shortfall for creation of urban infrastructure in tier 2 and tier 3 cities. Interest rate on UIDF loans has been kept at bank rate minus 1.5 percent i.e.5.25% at present.
- The loan (principal) will be repayable in 5 equal annual installments within 7 years from the date of withdrawal, including a moratorium period of two years while interest will be payable on quarterly basis.

Eligible projects:

- Focus will be on basic services like sewerage and solid waste management, water supply and sanitation, construction and improvement of drains/storm water drains, etc. and impact-oriented projects would be prioritised.
- The minimum size and maximum size of the project proposal shall be ₹5 crores (₹ 1 crore for northeast & hilly States) and ₹ 100 crore respectively.
- The fund shall not be utilised for any type of maintenance works or for administrative/establishment expenses. Further, housing, power and telecom, rolling stock like buses and trams, urban transport, health and education institutions would remain out of the purview of UIDF.

Fund allocation:

- Allocation has been done based on the urban population percentage in respective States/UTs in the eligible towns/cities out of total population in eligible town/cities in the country.
- For wider coverage and maximisation of benefit of these low cost funds, States have been advised to leverage resources from the grants of the 15th Finance Commission, as well as existing schemes, and to adopt appropriate user charges while accessing the UIDF.
- The normative allocation of the first tranche of ₹ 10,000 crore under UIDF for 2023-24 has been advised by NHB to States and UTs inviting project proposals under the Fund.

National Housing Bank

- National Housing Bank is a statutory organisation set up on July 9, 1988 under the National Housing Bank Act, 1987. NHB is wholly owned by the Reserve Bank of India, which contributed the entire paid-up capital.
- NHB grants direct loans to Public Agencies directly or in partnership with private developers under PPP model to development of housing projects as per the
- Schemes/Guidelines of NHB. NHB does not deal directly with the public. Refinance Schemes of NHB are applicable to various categories of Primary Lending Institutions (PLIs) viz, Scheduled Banks (including RRBs), HFCs etc. NHB is allowed to take deposits, but at present it is not offering any deposit scheme. National Housing Bank (NHB), had launched two deposit schemes in December, 2008 namely “**SUNIDHI Term Deposit Scheme**” & “**SUVRIDDHI Tax Saving Term Deposit**
- **Scheme**”. NHB has decided to discontinue aforementioned Term deposit schemes from 2017.

Topic 34. IMPORT OF UREA WILL EASE BY 2025

Important for the subject: Economy

Union Minister for Chemicals and Fertilisers, Manukh Mandaviya, **proposed a special package worth ₹3.7 lakh crore for farmers to address unbalanced fertiliser use** in the country.

- The **nitrogen, phosphorus, and potassium ratio should ideally be 4:2:1, but it**

currently stands at 8:3:1.

- The imbalance in soil health has led to saturated production and interconnected issues of soil, human, animal, and environmental health. The **scheme aims to promote overall health by addressing the imbalances caused by excessive fertiliser use.**
- The balanced use of fertilisers is crucial for steady production, food security, and supporting farmers. There are **no plans to completely stop the consumption of chemical fertilisers**, but the country is gradually transitioning towards natural and organic farming.
- The **government aims to end urea import dependence by 2025 and replace it with nano urea and other alternatives.**

Conventional Artificial Urea

- Urea is a white crystalline organic chemical compound. It is the most important nitrogenous fertiliser in the country because of its high N content (46%N).
- Urea consists of Nitrogen, Carbon, and Oxygen. Formula: $\text{CH}_4\text{N}_2\text{O}$ Besides its use in the crops, it is used as a cattle feed supplement to replace a part of protein requirements. It has also numerous industrial uses notably for production of plastics.

Uses of Urea

- As fertilizers as it increases the yield of crops
- As animal feed additive. As a cleaner; hair removal creams and dish soaps in the fermentation industry as a refrigerant neutralize pollutant in textile industries as a fuel for rocket engines manufacture of synthetic fibre like rayon and nylon in creams/ointments manufacturing melamine.

The only regulated Fertilizer

- **Urea is the only fertilizer at present with pricing and distribution being controlled statutorily by the Government.**
- The Central Govt. pays subsidy on urea to fertiliser manufacturers on the basis of cost of production at each plant and the units are required to sell the fertilizer at the government-set Maximum Retail Price (MRP).
- Thus, no one can sell urea above the MRP declared by the Govt. Under the Concession

Scheme, the MRP for each fertilizer is indicative in nature.

Nano Urea

- It is **urea in the form of a nanoparticle. It is a nutrient (liquid) to provide nitrogen to plants as an alternative to the conventional urea.**
- It is **developed to replace conventional** urea and it can curtail the requirement of the same by at least 50%. It contains 40,000 mg/L of nitrogen in a 500 ml bottle which is equivalent to the impact of nitrogen nutrient provided by one bag of conventional urea.
- It is **Indigenous Urea, introduced firstly by the Indian Farmers Fertiliser Cooperative Limited (IFFCO) for farmers across the world.** The first Liquid Nano Urea (LNU) plant is inaugurated at Kalol, Gujarat.

Significance

- The excess conventional urea causes an environmental pollution, harms soil health, and making plant more susceptible for disease & insect infestation, delayed maturity of the crop & production loss.
- Nano Urea Liquid makes the crops stronger, healthy and protects them from lodging effect.
- It will lead to reduction in Global Warming It will improve the quality of underground water by polluting it less. It will cut down post harvesting costs and increase farmers' income.

Topic 35. GST COUNCIL FOR 28% ON FULL FACE VALUE OF CASINO, ONLINE GAME, HORSE RACE BETS

Important for the subject: Economy

GST Council in its **50th meeting** has recommended **28 per cent rate** at full face value for **online gaming, casinos and horse racing.**

- The GST rate of **28 per cent** at **full face value** for online gaming, casinos and horse racing has been recommended by the GST council.
- The GST council had discussion on whether to impose a 28% GST on the face value of bets, gross gaming revenue, or just on platform fees and the council settled on taxing the turnover. Finally total turnover will be used as a base for taxation.

- It was further clarified that a 28 per cent rate will be applicable each time one is buying chips or placing bets.
- Further **no differentiation** has been made between **games of skill or chance**. Tax on e-gaming would be imposed without making any differentiation based on if the games require skill or based on chance. The decision to tax at 28 per cent was driven by the **moral point of view** of **how** gambling can be treated at the **same rate as essential goods and services**.
- Amendment will be made in the law to include online gaming and horse racing in Schedule III as **taxable actionable claims**. A Bill to implement the decision is expected during the forthcoming Monsoon Session.
- It was also noted that the **definition of online gaming** will be in **sync** with the definition in the **legislation** being proposed by the **IT Ministry**.
- Gaming industry has put forward the view that gamblers and e-gamers or games of skill should not be treated the same. The move is likely to slow the growth and innovation in the gaming industry.

Other key decisions:

- The Council also decided to exempt import of cancer drugs and food for special needs from GST
- Food and beverages in cinema halls are taxed like restaurant service, whether as part of service or independently of cinema exhibition. Cinema ticket and food and beverage supply clubbed together, to be taxed at 18%
- The **Financial Intelligence Unit (FIU)** can share information with the GST Network (GSTN) under the Prevention of Money Laundering Act (PMLA). This was required under FATF (Financial Action Tax Force) mechanism and it will empower tax officials

Gambling in India

- Gambling Act also known as **The Public Gambling Act,1867** is the law made to govern gambling in India. Gambling is a **state Important for the subject**, and only states in India are entitled to formulate laws for gambling activities within their respective states.
- **Goa and Sikkim** are the only exceptions which have allowed gambling and betting in their state, Important for the subject to regulation of their respective state Governments.

Some states like Goa have legalised casinos.

- Following states have passed specific laws to govern online gaming: **Sikkim, Meghalaya, Nagaland** Additionally, no states in India have **separate specific laws to regulate “games of skill”** except **Nagaland and Meghalaya**.
- **Fantasy league betting**, which refers to betting on fantasy football, cricket and other fantasy sports leagues, has been **mostly unregulated** across India. Andhra Pradesh, Telangana, Odisha, and Assam have outright banned betting on fantasy sports leagues as well.
- Telangana and Karnataka– banned all forms of online gaming and gambling. Similar laws banning all online games, including games of skill, were passed in **Kerala, Andhra Pradesh, and Tamil Nadu**. The laws in Kerala and Tamil Nadu were challenged and overturned in courts of law, to exempt games of skill.

GST Council

- Goods & Services Tax Council is a **constitutional body for making recommendations** to the Union and State Government on issues related to Goods and Service Tax.
- As per **Article 279A (1) of the amended Constitution, the GST Council has to be constituted by the President** within 60 days of the commencement of Article 279A.
- As per **Article 279A of the amended Constitution, the GST Council which will be a joint forum of the Centre and the States**, shall consist of the following members: –
- the Union Finance Minister-Chairperson; the Union Minister of State in charge of Revenue or Finance ...Member the Minister in charge of Finance or Taxation or any other Minister nominated by each State Government. Members.
- As per **Article 279A (4)**, the Council will make recommendations to the Union and the States on important issues related to GST, like the goods and services that may be Important for the subjected or exempted from GST, model GST Laws, principles that govern Place of Supply, threshold limits, GST rates including the floor rates with bands, special rates for raising additional resources during natural calamities/disasters, special provisions for certain States, etc.

Topic 36. GOVERNMENT IMPOSES CURBS ON CERTAIN GOLD JEWELLERY, ARTICLES

Important for the subject: Economy

In News: The government on Wednesday imposed import restrictions on certain gold jewelry and articles, a move which would help cut import of non-essential items.

- Now an importer would need a permission of license from the government for importing these gold products.
- However, the Directorate General of Foreign Trade (DGFT) said that the restrictions will not be there for imports under the **India-UAE free trade agreement**.
- As per the **Directorate General of Foreign Trade (DGFT) notification**, the import policy of these products has been amended from **free to restricted**.
- The move comes as importers over the last few months have been using a **policy flaw** to source plain **gold jewelry from Indonesia without paying any import taxes**. India levies a **15% tax on gold imports**.
- **Gold Loophole** There have been repeated incidents when substantially cheaper gold is imported from specific countries, taking advantage of a free trade agreement.
- **Case of Korea:** Jewellers were importing gold jewellery from South Korea under the Indo-Korea Comprehensive Economic Partnership Agreement, which was later addressed by an excise duty. This justified on the basis that South Korea does not mine any gold and was only exporting the metal to India after doing value addition through processing.
- **Case of Indonesia:** Here advantage was taken of the India-Asean Free Trade
- Agreement (FTA), where post GST adoption, Indonesian gold became cheaper relative to the major gold imported which is taxed at 15%. In case of Indonesia, applying excise was difficult as it is a gold-mining nation and thus fulfils the local value-addition norm as required under the free trade agreement.

Import Export Code

- IEC (Import Export Code) is required by anyone looking to start an import/export business in the India. It is issued by the DGFT. IEC is a 10-digit code that is **valid for a lifetime**. Generally, importers cannot import goods without the Import Export Code, and exporters cannot benefit from the DGFT for the export scheme, etc. without the IEC.

Situations Where IEC is not required

- According to the most recent government circular, **IEC is not required for all GST-registered traders.** In all such cases, the trader's **PAN will be interpreted as a new IEC code** for the purposes of import and export.
- Import Export Code (IEC) is not required if the goods exported or imported are for **personal use only** and are not used for commercial purposes.
- Import/Export done by Government of India Departments and Ministries, as well as Notified Charitable Institutions, do not require an Import Export Code.

Below are designated import certificate issuing authorities:

- The Department of Electronics for computer and computer-related systems; The Department for the Promotion of Industry and Internal Trade, Technical
- Support Wing, for organized sector units registered under it, except for computers and computer-based systems; The Ministry of Defense for defense-related items;
- The Director General of Foreign Trade for small-scale industries not covered above

Categories of Import

1. **Freely importable items:** Most capital goods fall into this category. Any product declared as Freely Importable Item does not require import licenses.
2. **Licensed Imports:** There are a number of goods, which can only be imported under an import license. This category includes some consumer goods; precious and semi-precious stones; products related to safety and security; seeds, plants and animals; some insecticides, pharmaceuticals and chemicals; some electronically items; several items reserved for production by the small-scale sector.
3. **Canalized Items:** There are certain canalized items that can only be imported in India through **specified channels or government agencies.** These include **petroleum** products (to be imported only by the Indian Oil Corporation); **nitrogenous phosphatic**, potassic and **complex chemical fertilizers** (by the **Minerals and Metals Trading Corporation**) vitamin- A drugs (by the State Trading Corporation); oils and seeds (by the State Trading Corporation and Hindustan Vegetable Oils); and cereals (by the Food Corporation of India).
4. **Prohibited items:** Only four items-tallow fat, animal rennet, wild animals and

unprocessed ivory-are completely banned from importation.

Import licensing

- Import licensing refers to the requirement of obtaining a license or permit from the importing country's government or designated authority before importing certain goods.
- This license may be necessary for various reasons, such as ensuring compliance with health and safety standards, controlling the import of certain sensitive goods, or implementing trade restrictions for specific reasons.

WTO and import licensing

- The WTO recognizes that import licensing can be used as a **legitimate trade policy tool**. However, it also sets **certain rules and guidelines to prevent the misuse** of import licensing measures, ensuring that they are **not used as unnecessary barriers to trade or protectionist measures that discriminate against foreign products**.
- Under the WTO's **Agreement on Import Licensing Procedures (ILP)**, member countries are required to establish transparent and predictable procedures for issuing and administering import licences. These procedures should be applied in a non-discriminatory manner, without unnecessary delays or restrictions.
- Additionally, the WTO's General Agreement on Tariffs and Trade (**GATT**) **prohibits quantitative restrictions on imports**, such as **quotas or bans**, unless they fall under specific exceptions allowed by the agreement. Import licensing measures should generally be in the form of non-quantitative restrictions and should not be used as a means to restrict imports beyond what is necessary.

Topic 37. A NETWORK THAT ENFORCES NUCLEAR DETENTE

Important for the subject: International Relations

Between **1945** and **1996**, the world witnessed as many as **2,000 nuclear explosion tests**; since then there have been **six tests in all** — two by India, one by Pakistan, and three by North Korea.

What happened in 1996?

- **CTBT** was negotiated at the **Conference on Disarmament** in **Geneva** and adopted by

the **United Nations General Assembly in 1996**.

- It seeks to **fully halt critical nuclear tests**. The **treaty can come into force only after all 44 nuclear weapon states have signed and ratified it**, which hasn't happened yet.
- **India, Pakistan and North Korea** refused to sign the treaty. **India** sees the **CTBT** as no different from the **Nuclear Non-Proliferation Treaty (NPT)**, which it vehemently opposes as discriminatory. Secondly, **India** wants to use the **CTBT** as a bargaining chip to gain concessions elsewhere.
- The **US, China, Israel, Egypt and Iran** have **signed but not ratified** the treaty. But the **Comprehensive Test Ban Treaty Organization (CTBTO)**, which was **set up to bring the treaty into force**, remains hopeful.

Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO):

- The **organization promotes the Treaty** so that it can enter into force. It establishes a **verification regime** to monitor adherence to the Treaty. The verification system is built around a network of over 325 seismic, radionuclide, infrasound and hydro-acoustic (underwater) monitoring stations.
- The organization was **founded in 1996**. It is **headquartered in Vienna**. It employs a staff of roughly 260 from the CTBT's Member States.
- The **CTBTO** has achieved a **key objective — preventing countries from conducting any further nuclear tests**. The **CTBTO** credits this to **its ability to detect any nuclear test anywhere** — on the ground, underground, atmosphere, or underwater.
- The organization's network of sensors and sensing technologies have useful spinoffs for industry and society. For example, they **find applications in monsoon forecasts, tsunami warnings, tracking whale movements, and research in radionuclides**.
- The **CTBTO's International Monitoring System (IMS)** runs over **300 'monitoring stations'** around the world, including many in some of the **"most remote and inhospitable Environments"**.

The **IMS** rests on **four pillars — seismic, infrasound, hydro-acoustic and radionuclides**.

1. SEISMIC

- With **two seismic networks — primary (50 stations) and auxiliary (120 stations) — the IMS can detect any vibration on the ground**.

- The **primary network** consists of **seismic array stations** that can determine the **type of seismic wave** and its origin or cause.
- The **auxiliary seismic stations** supplement the work of the primary stations. **IMS seismic network** can detect both (**Body wave** and **Surface wave**) types of waves.

2. INFRASOUND:

- The **audible sound frequency** is **2020,000 Hz**; **infrasound** is **below 4 Hz**. **Infrasonic waves** cause **minute changes in atmospheric pressure**, which are measured by **micro-barometers**.
- **Infrasound** travels long distances, which is useful in **detecting atmospheric nuclear explosions**.
- The **IMS infrasound monitoring system** has **60 array stations** in **35 countries**. Each array has **four or more elements** arranged in **geometric patterns**, a meteorological station, a central processing facility, and a communication system for data transmission.

3. HYDROACOUSTIC

- **Hydro-acoustic technology** is used to **measure changes in water pressure** caused by **sound waves**. **Hydro-acoustic data** can pinpoint the **location of a nuclear explosion underwater**, near the **ocean surface**, or near a **coastline**.
- Sound propagates efficiently through water but, at one level in the water, sound travel is slower but particularly efficient: the **‘sound fixing and ranging channel’** or **SOFAR**, at about **1,000 m** The **11 IMS hydro-acoustic stations** keep an ear on all the oceans and provide **tsunami warnings**.

4. RADIONUCLIDE

- The **presence of radionuclides** — **isotopes of elements that undergo radioactive decay** — is the clinching evidence of a **nuclear explosion**. **Isotopes of noble gases** — xenon, in particular — are **produced only by nuclear fission**; hence, radionuclides are a **‘smoking gun’**.
- The **IMS** has **80 radionuclide stations** and **16 radionuclide laboratories**. **All the stations of IMS** generate a lot of data daily, which is sent to its **international data center (IDC) in Vienna**.
- The **IDC** today is a massive repository of data, which serves as fantastic raw material for

scientific research.

Seismic waves:

- Typically a seismic event generates two types of waves — **body waves (P and S waves)** and **surface waves (Rayleigh and Love waves)**, which **differ in speed, direction and medium of propagation**. **Body waves** travel through the **earth's depths**, and **surface waves** move along the **surface**.

P Waves:

- **P waves, or Primary waves**, are the **first waves to arrive at a seismograph**. P waves are the **fastest seismic waves** and can **move through solid, liquid, or gas**. They leave behind a **trail of compressions and rarefactions** on the medium they move through.
- P waves are also called **pressure waves for this reason**. Certain animals, such as dogs, can feel the P waves much before an earthquake hits the crust (surface waves arrive). Humans can only feel the ramifications it has on the crust.

S Waves:

- **S waves, or secondary waves**, are the **second waves to arrive during an earthquake**. They are **much slower than P waves** and can **travel only through solids**. It is after studying the **trajectory of S waves** through the layers of the earth, scientists were able to conclude that the earth's outer core is liquid.

Rayleigh Waves:

- British physicist **Lord Rayleigh** demonstrated the **Rayleigh Waves mathematically**.
- A **Rayleigh wave** is a seismic surface wave producing a **sudden shake in an elliptical motion**, with no crosswise or perpendicular motion. It **moves along the ground** just like a wave moves across a lake or an ocean.
- The greater part of the shaking felt from an earthquake is because of the Rayleigh wave, which can be considerably bigger than other waves. Because it rolls, it moves the ground up and down and side-to-side in the same direction that the wave is moving.

Love Waves:

- **Much slower than Body Waves** but are the **fastest surface wave** and **move the ground**

from side to side. Love wave is also a seismic surface wave led to the horizontal shifting of the earth during an earthquake.

- Confined to the surface of the crust Love waves always produce entirely horizontal motion. They exist only in the presence of a semi-infinite medium overlain by an upper finite thickness.

Topic 38. SOLOMON ISLANDS AND CHINA SIGN DEALS ON POLICE, ECONOMY, TECH

Important for the subject: International Relations



China and the Solomon Islands signed a deal on police cooperation as part of an upgrade of their relations to a “comprehensive strategic partnership“, four years after the Pacific nation switched ties from Taiwan to China.

The police cooperation pact was among nine deals signed after Solomon Islands Prime Minister Manasseh Sogavare met with Chinese Premier Li Qiang in Beijing, underlining his

nation's foreign policy shift.

Solomon Islands

- Solomon Islands is a **nation in Melanesia, lies east of Papua New Guinea and northwest of Vanuatu.**

Melanesia is a sub region of Oceania in the southwestern Pacific Ocean.

- The country's islands lie between latitudes 5° and 13°S. It consists of six major islands and over 900 smaller islands.

Its capital, Honiara, is located on the largest island, Guadalcanal.

- The Solomon Islands archipelago, includes Choiseul, the Short land Islands, the New Georgia Islands, Santa Isabel, the Russell Islands, the Florida Islands etc.
- **It consists of a double chain of volcanic islands and coral atolls in Melanesia. The islands' ocean-equatorial climate is extremely humid throughout the year.**
- The island is a **constitutional monarchy**, with the British monarch, represented by a governor-general, serving as the formal head of state.
- Still, the country, a **member of the Commonwealth**, is independent, and the governor-general is appointed on the advice of the unicameral National Parliament.

Topic 39. MAPUTO PROTOCOL CONTRIBUTED TOWARDS AFRICA'S PROGRESS ON GENDER EQUALITY, BUT GROWTH UNEVEN: REPORT

Important for the subject: International relations

There has been some progress on gender equality in African countries due to the **Maputo Protocol**, but it has been uneven, according to a new report.

The report: **20 Years of the Maputo Protocol: Where are we now?**

About the Maputo Protocol:

- The **Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa**, better known as the **Maputo Protocol**, is an international human rights instrument established by the **African Union** that went into effect in **2005**.

It **guarantees comprehensive rights to women** including

- The right to take part in the political process, To social and political equality with men, Improved autonomy in their reproductive health decisions, and An end to female genital mutilation.
- It was **adopted** by the **African Union** in **Maputo, Mozambique**, in **2003** in the form of a protocol to the **African Charter on Human and Peoples' Rights** (adopted in 1981, enacted in 1986). The **Protocol** is considered one of the **world's most progressive legal frameworks for women's rights** and was launched 20 years ago in **2003**.
- The Protocol has a target of **universal ratification in Africa by 2028**. However, with just five years until the target year, there are still **12 countries that are yet to ratify this important legal instrument**. In **two decades (2003-2022)**, **women's labour force participation rate (LFPR)** in most African nations as compared to that of men remains low.
- In **24 countries**, the share of women in the labour force has decreased. So, there is an urgent need for **Botswana, Burundi, Central African Republic, Chad, Egypt, Eritrea, Madagascar, Morocco, Niger, Somalia** and **Sudan** to renew their commitments and ratify the **Maputo Protocol** in order to deliver on their promises to the women and girls in their countries.
- There has been an **improvement in women's participation** in the **political and decision-making processes**. In most of the **AU states**, **women's representation in Parliament has increased**.
- For example in **Rwanda**, women's share in Chamber of Deputies or Lower House increased to **61.3 per cent** in April 2023 from **25.7 per cent in April 2003**.

Challenges remain:

- When **54 per cent** of the **AU states** mandate **equal remuneration for equal work or fair / just pay** as per **Article 13** of the Protocol, **46 per cent do not**. These are:
- Botswana, Burkina Faso, Cabo Verde, Cameroon, Central African Republic and DR Congo. Women's economic rights and opportunities and access to social welfare and protection are significantly affected by external factors such as **conflict, COVID-19, the pandemic** and **climate change**. Up to 10 million more girls are at risk of becoming child brides by 2030.

Topic 40. GAMBIA MANDATES PRE-SHIPMENT TESTING FOR INDIAN PHARMA

Important for the subject: International Relations



Western African nation The Gambia, where the deaths of at least 66 children last year was linked to an Indian cough syrup, has introduced a pre-shipment inspection and testing for Indian pharmaceuticals.

About Gambia

- It is the **smallest country within mainland Africa**. It is surrounded by Senegal, except for its western coast on the Atlantic Ocean. Banjul is the capital of Gambia.

Geography of Gambia

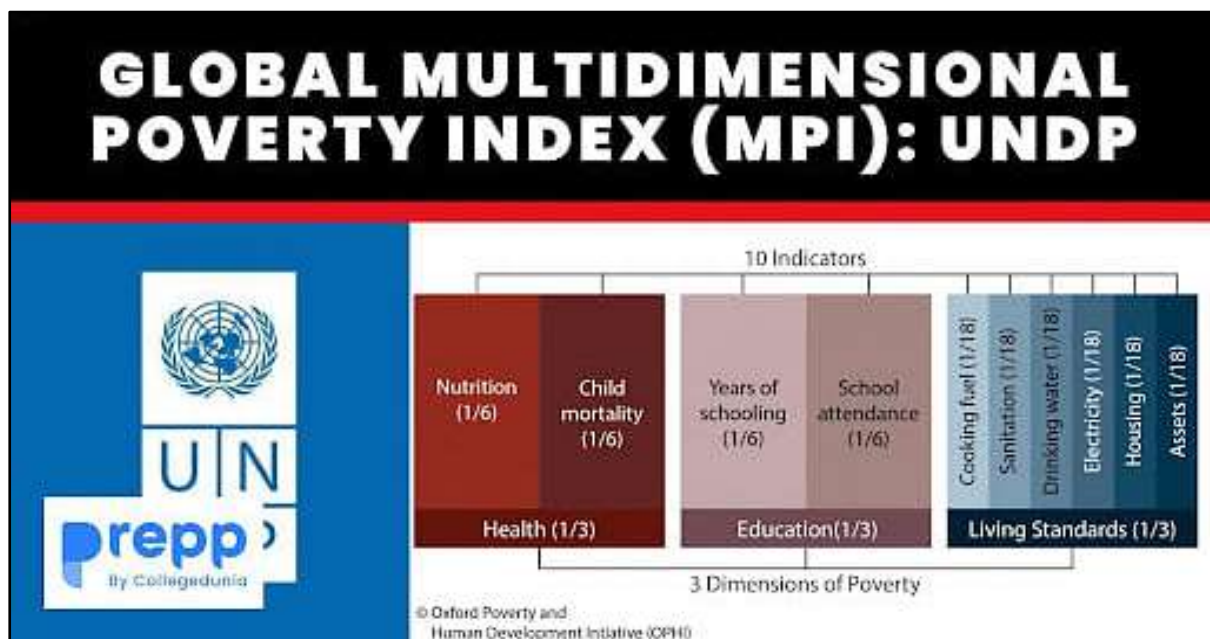
- The Gambia is a very small and narrow country whose borders mirror the meandering Gambia River.
- It lies between latitudes 13 and 14°N, and longitudes 13 and 17°W. Senegal surrounds the Gambia on three sides, with 80 km of coastline on the Atlantic Ocean marking its western extremity. It contains three terrestrial ecoregions: Guinean forest-savanna mosaic, West Sudanian savanna, and Guinean mangroves.

Ethnic groups:

- The Mandinka ethnicity is the largest ethnic group. There are other ethnic groups like Fula, Wolof, Jola/Karoninka, Serahule / Jahanka, Serers, Manjago, Bambara, Aku Marabou and Bainunka.

Topic 41. MULTIDIMENSIONAL POVERTY INDEX OF UNDP

Important for the subject: International Relations



The United Nations Development Programme (UNDP) and the Oxford Poverty and Human Development Initiative (OPHI) released the latest update of the global Multidimensional Poverty Index (MPI).

The report highlights the remarkable progress made by India in reducing poverty, with 415 million people lifted out of poverty between 2005-06 and 2019-21.

India's Poverty Reduction Success:

- The incidence of poverty in India declined from 55.1% to 16.4% during the 15-year period.
- In 2005-06, around 645 million people were in multidimensional poverty, which decreased to approximately 370 million in 2015-16 and 230 million in 2019-21.
- India is among 25 countries that successfully halved their global MPI values within 15

years, including Cambodia, China, Congo, Honduras, Indonesia, Morocco, Serbia, and Vietnam.

Global Multidimensional Poverty Index

- The index is a key international resource that **measures acute multidimensional poverty across more than 100 developing countries**. It was **first launched in 2010** by the **OPHI and the Human Development Report Office of the UNDP**.
- The MPI **monitors deprivations in 10 indicators** spanning **health, education and standard of living and includes both incidence as well as intensity of poverty**.

MPI Indicators and Dimensions:

- A person is multidimensionally poor if she/he is deprived in one third or more (means 33% or more) of the weighted indicators (out of the ten indicators). Those who are deprived in one half or more of the weighted indicators are considered living in extreme multidimensional poverty.

Topic 42. ARCHAEOLOGISTS COME UP WITH RARE FINDINGS IN TAMIL NADU

Important for the subject: History

A gold stud, a bone point and a carnelian bead have been unearthed by archaeologists at **Porpanaikottai in Pudukottai district of Tamil Nadu**, where the State Archaeology Department has taken up excavation this year. A **Sangam-age fort is believed to have existed at the site**.

- A **three-course brick structure was unearthed** within a few days of digging. Over 150 antiques, including potsherds, hopscotches, spouts, pieces of glass bangles and beads, a terracotta lamp, a coin, a spindle whorl and rubbing stone, besides a couple of graffiti, have been found at the site so far.
- **Porpanaikottai, situated about 6.5 km to the east of Pudukottai town, is one of the new sites where the Department had taken up excavation this year.**

Existence of fort

- Studies carried out at the site using Light Detection and Ranging (LIDAR), a remote

sensing method, had indicated that a **fort had existed at Porpanaikottai**.

- A habitation mound spread over 1.26 hectares is believed to have existed within the fort. The excavation is currently focused on this area.

Topic 43. INDIA DECOLONIZING EDUCATION MODEL

Important for the subject: History

Stating that India is now “**getting out of the Macaulay model of education and decolonising**” it, Union minister Dharmendra Pradhan on Tuesday said while

India’s foundation lies in the Vedic era, “our goal should remain to become a global benchmark”.

Macaulay’s Minute of Education

- Lord Macaulay arrived in India on June 10, 1834, as a **law member of the Governor General’s Executive Council** and was appointed **President of the Committee of Public Instruction**.
- In 1835, he was tasked with **settling a dispute between orientalist and Anglicists**. He presented his **famous minutes to the council in February 1835**, which Lord Bentinck approved, and a resolution was passed in March 1835.

The **following points were emphasized** by him:

- The main goal of the British government should be to promote European literature and science among Indians, and that “all funds appropriated for the purpose of education would be best spent on English education alone.”
- All existing professors and students at all institutions under the committee’s supervision shall continue to receive stipends, but no stipend shall be given to any students who may subsequently enter any of these institutions.
- No funds from the government were to be spent on the printing of oriental works. All funds available to the government would be spent in the future on imparting knowledge of English literature and science to Indians.

Topic 44. REMEMBERING A LONG-FORGOTTEN HERO- NAWAB WAJID ALI SHAH

Important for the subject: History

Nawab Wajid Ali Shah

Mirza Wajid Ali Shah, known as **Nawab Wajid Ali Shah**, was born in year 1887 and was the **last king of Awadh**. Awadh was significant region and was known for its gardens, granary, and was considered a queen-province of India.

After the 9 year of his rule, The **Awadh was annexed in 1856 by EIC and made a buffer state**. Soon after the king was exiled to Garden Reach in Metiabruz and was provided a pension. He was an excellent connoisseur of art and patronized artists around him. He spent the last years of his life in Metiabruz on the outskirts of Kolkata.

Contribution to Art

- Himself being a poet, a playwright, a gifted composer and an admirer of dance, he patronized various art forms and associated artists.

Dance

- A classical Indian dance form, **Kathak**, was introduced by him as a court dance.
- His Kathak teacher was Thakur Prasad ji.
- He provided artistic guidance, financial assistance to make this dance form achieve greater heights and a definite form.
- He is also believed to start two distinct forms of dance called Rahas and Raas.

Music

- He patronized a light classical form of **thumri music**. Most famous is **bhairavi thumri** “**Babul Mora Naihar Chhooto Jaay**” He also supported and encourages ragas like Tilak, pilu, sendura, khammach, bhairvi and jhanjhauti.
- As a gifted musician he composed various musical compositions such as poems, prose and thumris, under a pseudonym Akhtarpiya.

Gazhals : Diwan-i-Akhtar and Husn-i-Akhtar

Ragas : Jogi, Juhi, Shah-Pasand

Hindustani theatre

- Establishment of **Parikhaana** – a place to teach music and dance to beautiful and talented girls by expert trainers.
- By staging Rasleela he promoted this theatre art form. Some historians and experts believe his to be the first playwright of the Hindustani theatre.

Playwright

- Radha Kanhaiyya Ka Qissa; Darya-i-Tashsq; Bhahar-i-Ulfat etc.

Poetry

- He was known to use a poetic takhallus, a pen name used by poets, Qaisar. Works in poetry Sawat-ul-Qalub; Huzn-i-Akhtar
- He also **patronized the famous poet Mirza Ghalib**.

Topic 45. WORDS LIKE FAKE, FALSE, MISLEADING IN IT RULES PROBLEMATIC

Important for the subject: Polity

Constitutional validity of the **IT (Intermediary Guidelines and Digital Media Ethics Code) Amendment Rules, 2023** is being questioned in the Bombay High Court.

Information Technology Amendment Rules, 2023

- Online gaming intermediaries must make efforts to not give a platform or advertise any online game that can cause the user harm or that has not been verified as a permissible online game by an online gaming self-regulatory body.
- Online gaming intermediaries in relation to online games involving real money must display a mark of verification by the self-regulatory body on such games.
- The government can choose to designate multiple self-regulating bodies for the online gaming industry. These bodies will represent the industry, but they will operate independently from the members of the industry.
- The new rules require online platforms to not post, share, or **host any information that is**

fake, false, or misleading about the Central Government's work. This fake, false, or misleading information will be identified by the notified Fact Check Unit of the Central Government.

- Failure to comply with the guidelines of the Fact-Checking Unit might result in **losing the safe harbour protection which safeguards the intermediaries from litigation.**

Safe Harbour Principle

- The safe harbour principle of the IT Act, 2000 relieves the internet intermediaries from responsibility for third-party content on their platforms. This provision ensures that social media platforms are not liable for posts published by users.

Topic 46. SC SEEKS CENTRE, EC RESPONSE ON DELIMITATION

Important for the subject : Polity

The Supreme Court on July 11 prima facie **disagreed with the legal stand of the Election Commission of India (ECI) that it can only begin the delimitation process in Manipur, Assam, Nagaland and Arunachal Pradesh after only getting an authorization from the Centre.**

Background:

- In pursuance to the request received from Ministry of Law & Justice, Government of India, Election Commission of India decided to initiate the delimitation exercise of Assembly and Parliamentary Constituencies in the State of Assam as per Section 8A of the Representation of the People Act, 1950. Unlike other States, the ECI, and not the Delimitation Commission, have to conduct the delimitation exercise in these four States.
- In the latest hearing, the **SC observed that the Election Commission of India did not require the authorisation of the Government of India to conduct the exercise of delimitation.**

Delimitation in NE States

- **Section 8A of The Representation of the People Act, 1950** deals with the delimitation of Parliamentary and Assembly Constituencies in the **States of Arunachal Pradesh, Assam, Manipur or Nagaland.**

- Section 8A (1) says that, Important for the subject to **being satisfied that the conditions were conducive, the President can rescind the deferment of the delimitation exercise in the four States** and provide for the conduct of delimitation exercise by the Election Commission.
- Section 8A (2) provides that the **Election Commission has to start the delimitation process to determine Parliamentary and Assembly constituencies in the four States as soon as the President rescinds the order.**
- Within the **Constitutional Provisions and RPA 1950, there is no such mandate to take authorization of centre before starting a delimitation exercise.**

Provisions supporting Delimitation:

- As mandated under Article 170 of the Constitution, census figures (2001) shall be used for the purpose of readjustment of Parliamentary and Assembly
- Constituencies in the State. Reservation of seats for the Scheduled Castes and Scheduled Tribes will be provided as per Articles 330 & 332 of the Constitution of India.

Topic 47. NATIONAL RESEARCH FOUNDATION

Important for the subject: Polity

National Research Foundation (NRF)

NRF is a proposed entity that will **replace the Science and Engineering Research Board of India (SERB)** and catalyse and channel interdisciplinary research for accelerating India's ambitious development agenda, through impactful knowledge creation and translation.

The NRF's Goals:

- Promote interdisciplinary research that will address India's most pressing development challenges. Minimize duplication of research efforts. Promote the translation of research into policy and practice.

Features of NRF:

- The NRF will be **presided by the Prime Minister and consist of 10 major directorates**, focusing on different domains of science, arts, humanities, innovation and entrepreneurship.

- The NRF will have an 18-member board with eminent Indian and international scientists, senior government functionaries and industry leaders. The NRF will be **registered as a society and have an independent secretariat.**

Funding of the NRF:

- The NRF will **operate with a budget of ₹50,000 crore for five years**, with 28% (₹14,000 crore) **funded by the government** and 72% (₹36,000 crore) **from the private sector.**
- The government's share is proposed to increase to ₹20,000 crore per year, with ₹4,000 crore sourced from the existing Science and Engineering Research Board's budget.

Concerns over funding:

- The allocated funding for the NRF, **less than 2% of the nation's gross domestic expenditure on research and development (GERD)**, is considered inadequate compared to other major economies like the U.S. and China. India's GERD was significantly lower than the U.S. and China in 2017-18, highlighting the need for increased investment in research and development.

Facilitating the "ease of doing science":

- The NRF needs to minimize the time between grant application and fund disbursement, ensuring a maximum turnaround time of six months. Digital processing of paperwork and financial transactions should be implemented to eliminate the need for physical copies and streamline administrative processes.
- The NRF should have independent spending guidelines to provide flexibility while maintaining accountability, separate from the General Financial Rules and the government e-Marketplace (GeM).
- Timely release of funds should be ensured, and mechanisms should be established to facilitate and implement this effectively.

Private sector participation and funding:

- While the involvement of the private industry in the NRF is welcome, the mechanisms for raising ₹36,000 crore from the industry require more detailed planning and the

establishment of secure mechanisms, such as escrow accounts.

Learning from international models:

- The NRF draws inspiration from international science agencies like the U.S. National Science Foundation and science agencies in Germany, the U.K., Switzerland, Norway, South Korea, and Singapore.
- The success of the NRF will depend on the government's ability to set and implement transparent rules that differ from existing practices, with a focus on critical thinking, creativity, and innovation.

Topic 48. GOVERNMENT TO SHARE PM GATI SHAKTI DATA

Important for the subject: Schemes

The government is working out a mechanism to share data with industry and potential investors about multi-modal connectivity as well as other physical and social infrastructure captured on the PM Gati Shakti platform.

- The **Network Planning Group (NPG) under PM Gati Shakti**, has recommended five projects worth Rs 15,683 crore from the Ministry of Road Transport and Highways, in its 51st meeting. These projects — located in Mizoram, Maharashtra, Uttarakhand, and Kanpur — aim to improve connectivity to industrial clusters and social sector assets.
- They also aim to enhance logistics efficiency by streamlining freight traffic movement and reducing congestion in cities.

GIS platform

- The GIS platform integrates the geospatial data related to the infrastructure in the country and planning portals of various ministries and departments.
- The portal offers access to over 1,460 layers of data, covering various aspects such as land, ports, forest, and highways.

PM Gati Shakti NMP

- The PM Gati Shakti NMP was launched in October 2021. **Objective:** Holistic integration of various ministries and to address the gaps to ensure infrastructure for seamless movement of people, goods and services.

- The PM Gati Shakti National Master Plan is driven by seven engines – roads, railways, airports, ports, mass transport, waterways, and logistics infrastructure.
- **Composition:** The NPG is composed of representatives from various connectivity infrastructure ministries and departments. These representatives include the heads of the network planning division, and their purpose is to ensure unified planning and integration of the proposals
- **Development this fiscal:** As of this fiscal year, a total of 85 major infrastructure projects worth Rs 5.4 lakh crore from various ministries have been recommended for approval under the initiative. All logistics and connectivity infrastructure projects requiring investments of over Rs 500 crore are directed through the NPG.

Infrastructure as nation's growth engine: Budget 2023

- In the budget, the government took a bold step and increased the capital investment outlay to Rs 7.5 lakh crores. The budget 2023 increased the capital expenditures on Indian Railways by nine times more than the sum for the fiscal year 2013–14.

Topic 49. CENTRE ADDING MORE SERVICES TO AYUSHMAN BHARAT HEALTH CENTRES

Important for the subject: Schemes



India's five-year-old Ayushman Bharat-Health and Wellness Centres (AB-HWCs)

programme, which has grown to more than 1.60 lakhs centres and registered a footfall of over 178.87 crore (as of June end), is undergoing its biggest ever expansion of services, confirmed sources in the Health Ministry.

Under the latest expansion spree, the Central government is adding services, including **screening, prevention, control & management of non-communicable diseases, care for common ophthalmic & ENT problems, basic oral health care, elderly and palliative health care services, emergency medical services, and screening and management of mental health ailments.**

Essential list of medicines and diagnostics has been expanded

- The essential list of medicines and diagnostics has been expanded to make available 171 medicines at Primary HWCs and 105 at Secondary Health Care-HWC and 63 diagnostics at PHC-HWC and 14 at SHC-HWC.

New cadre of Community Health Officers

- A new cadre of Community Health Officers, 1.29 lakh in position, has been introduced at the level of SHC-HWC.
- They will act as clinicians as well as public health managers. They will lead the team of Accredited Social Health Activists (ASHA), Anganwadi Workers (AWW) and Auxiliary Nurse Midwives (ANM).

About AB-HWCs

- Started in 2018, AB-HWCs aims to deliver **Comprehensive Primary Health Care that is universal and free to users.** It focuses on wellness and the delivery of an expanded range of services closer to the community.
- These centres deliver a range of comprehensive health care services like maternal and child health, services to address communicable and non-communicable diseases and services for elderly and palliative care.
- AB-HWCs provide free essential medicines and diagnostic services, teleconsultation, and health promotion including wellness activities like Yoga.

Target

- 1,50,000 Sub Health Centres (SHC), Primary Health Centres (PHC) and Urban Primary Health Centres (UPHC) to be transformed as Health Wellness Centres by As of 8 July 2023, there are 1,60,074 functional HWCs in India.
- As on June 30, 2023, more than 2.16 crores wellness sessions have been conducted with participation of 23.83 crores individuals

Key Components

- The delivery of comprehensive primary health care through HWCs involve is complex task as it requires a paradigm shift at all levels of health systems.

PM-Ayushman Bharat Health Infrastructure Mission

- The scheme aims at **strengthening healthcare infrastructure** across the country. Its objective is to **fill gaps in public health infrastructure, especially in critical care facilities and primary care in both urban and rural areas.**
- Through this, critical care services will be available **in all the districts of the country with more than five lakh population** through exclusive critical care hospital blocks, while the remaining districts will be covered through referral services.
- It will provide **support to 17,788 rural Health and Wellness Centres in 10 ‘high focus’ states and establish 11,024 urban Health and Wellness Centres** across the country.
- People will have access to a **full range of diagnostic services** in the public healthcare system through a network of laboratories across the country.
- Integrated public health labs will also be set up in all districts, giving people access to “a full range of diagnostic services” through a network of laboratories across the country.
- All the public health labs will be connected through the Integrated Health Information Portal, which will be expanded to all states and UTs. An IT-enabled disease surveillance system will be established through a network of surveillance laboratories at block, district, regional and national levels.

Institutions to be set-up under the scheme:

- Under the scheme, a national institution for one health, four new national institutes for virology, a regional research platform for WHO (World Health Organization)
- South East Asia Region, nine biosafety level-III laboratories, and five new regional national centres for disease control will be set up.

- **Biosafety Level 3:** The pathogens that can cause serious health hazards are worked under biosafety level 3.

Topic 50. SCHEDULE M TO BE MANDATORY FOR MSME PHARMA FIRMS SOON

Important for the subject: Schemes

India's **small drugmakers in the micro, small, and medium enterprises (MSME)** sector will soon be required to **adhere to the good manufacturing practices outlined in Schedule M of the Drugs and Cosmetics Act.**

Health Minister Mansukh Mandaviya announced this decision after engaging with industry representatives, emphasizing the need for quality assurance and reducing compliance burdens. The move aims to uphold India's reputation as the world's pharmacy by ensuring the highest standards in drug manufacturing.

Phase-wise Implementation of Schedule M:

- The adherence to Schedule M practices will be implemented gradually in MSME pharma firms.
- **Schedule M guides on Good Manufacturing Practices** regarding company premises, quality control system, quality check laboratories, production, cleaning of equipment, housekeeping, cross-contamination, and other related topics.
- **Schedule M-I:** Deals with the requirements of factory premises for manufacturing of Homeopathic preparations.
- **Schedule M-II:** Deals with the requirements of premises, plant, and equipment for manufacture of cosmetics.
- **Schedule M-III:** Deals with the requirements of premises, plant, and equipment for manufacture of Medical devices.

Applicability

- These practices are applicable to all manufacturers of drugs and cosmetics who have their manufacturing facility with a good manufacturing practice facility registration.
- The manufacturing facility should aim to ensure that all personnel concerned with the manufacture know the information necessary to decide whether or not to release a batch

of drugs for sale and to create an audit trail for future reference which shall permit investigation of the history of any suspected defective batch.

Topic 51. CENTRE TOLD TO CLARIFY STAND ON PLACES OF WORSHIP ACT BY OCT. 31

Important for the subject : Governance

The Supreme Court on July 11 gave the Centre “sufficient time” till October 31 to **clarify its stand on the validity of the Places of Worship Act**, which protects the identity and character of religious places as they were on Independence Day.

Places of Worship Act

- It is described as “An Act to prohibit conversion of any place of worship and to provide for the maintenance of the religious character of any place of worship as it existed on the 15th day of August 1947, and for matters connected therewith or incidental thereto.”

Exemption

- The disputed site at Ayodhya was exempted from the Act. Due to this exemption, the trial in the Ayodhya case proceeded even after the enforcement of this law.

Besides the Ayodhya dispute, the Act also exempted:

- Any place of worship which is an ancient and historical monument, or an archaeological site covered by the Ancient Monuments and Archaeological Sites and Remains Act, 1958.
- A suit that has been finally settled or disposed of. Any dispute that has been settled by the parties or conversion of any place that took place by acquiescence before the Act commenced.

Penalty

- **Section 6 of the Act** prescribes a **punishment of a maximum of three years imprisonment along with a fine** for contravening the provisions of the Act.

Criticism

- The law has been challenged on the ground that it bars judicial review, which is a basic

feature of the Constitution, imposes an “arbitrary irrational retrospective cutoff date,” and abridges the right to religion of Hindus, Jains, Buddhists, and Sikhs.

What are its other Provisions?

Section 3: This section of the Act bars the conversion, in full or part, of a place of worship of any religious denomination into a place of worship of a different religious denomination or even a different segment of the same religious denomination.

- **Section 4(1):** It declares that the religious character of a place of worship “shall continue to be the same as it existed” on 15th August 1947.
- **Section 4(2):** It says any suit or legal proceeding with respect to the conversion of the religious character of any place of worship existing on 15th August, 1947, pending before any court, shall abate and no fresh suit or legal proceedings shall be instituted.
- The provision to this subsection saves suits, appeals, and legal proceedings that are pending on the date of commencement of the Act if they pertain to the conversion of the religious character of a place of worship after the cut-off date.
- **Section 5:** It stipulates that the Act shall not apply to the Ramjanmabhoomi-Babri Masjid case, and to any suit, appeal, or proceeding relating to it.

What was the Supreme Court’s view during the Ayodhya Judgment?

- In the 2019 Ayodhya verdict, the **Constitution Bench referred to the law** and said it **manifests the secular values of the Constitution** and **prohibits retrogression**.
- The law is hence a legislative instrument designed to protect the secular features of the Indian polity, which is one of the basic features of the Constitution.

Topic 52. INDIA CURBS GOLD IMPORTS TO CHECK RISING INDONESIAN SHIPMENTS

Important for the subject : Governance / IR

The sudden spurt in duty-free imports of gold jewellery from Indonesia under the free trade agreement was one of the main reasons for the Indian Government’s decision to ban shipments of certain gold jewellery products.

The Government suspects that **gold is being re-routed into India from other countries**

without payment of any duty under the India-ASEAN free trade agreement as Indonesia was never known for exporting gold jewellery to India.

In a notification, the **Directorate General of Foreign Trade** amended the import policy for **unstudded jewellery made of gold and other gold articles** to “restricted” category from “free”.

India-ASEAN Free Trade Agreement

- The initial framework agreement for **ASEAN–India Free Trade Area (AIFTA)** was signed on 8 October 2003 in Bali, Indonesia.
- The FTA came into effect on 1 January 2010. The FTA had **emerged from a mutual interest of both parties to expand their economic ties in the Asia-Pacific region.**

Background of the AIFTA

- India’s Look East policy was reciprocated by similar interests of many ASEAN countries to expand their interactions westward.
- After India became a sectoral dialogue partner of ASEAN in 1992, India saw its trade with ASEAN increase relative to its trade with the rest of the world.
- Between 1993 and 2003, ASEAN-India bilateral trade grew at an annual rate of 11.2%, from US\$2.9 billion in 1993 to US\$12.1 billion in 2003.
- Total Indian FDI into ASEAN from 2000 to 2008 was US\$1.3 billion. Acknowledging this trend and recognising the economic potential of closer linkages, both sides recognised the opportunities to pave the way for the establishment of an ASEAN–India Free Trade Area (FTA).

Structure of the AIFTA

- The signing of the ASEAN-India Trade in Goods Agreement paves the way for the creation of one of the world’s largest FTAs – a market of almost 1.8 billion people with a combined GDP of US\$2.8 trillion.
- It sees tariff liberalisation of over 90 percent of products traded between the two dynamic regions, including the so-called “special products”. The products include palm oil (crude and refined), coffee, black tea and pepper.

Topic 53. GURU PADMASAMBHAVA

Important for the subject : Art and Culture

About Guru Padmasambhava

- Guru Padmasambhava was **born in India and travelled all across Himalayan region** in the **8th century to spread Buddhism and Buddhist teachings** Guru Padmasambhava is **highly revered in Bhutan.**
- There is an image or painting of the Guru Padmasambhava in every Bhutanese home or temple. Guru Padmasambhava was also known as Guru Rinpoche is widely venerated as a “**second Buddha**” by adherents of **Tibetan Buddhism** in Tibet, Nepal, Bhutan, the Himalayan states of India, and elsewhere.
- Guru Padmasambhava is also considered to be the **founder of Nyingma tradition, oldest of the four major schools of Tibetan Buddhism.**